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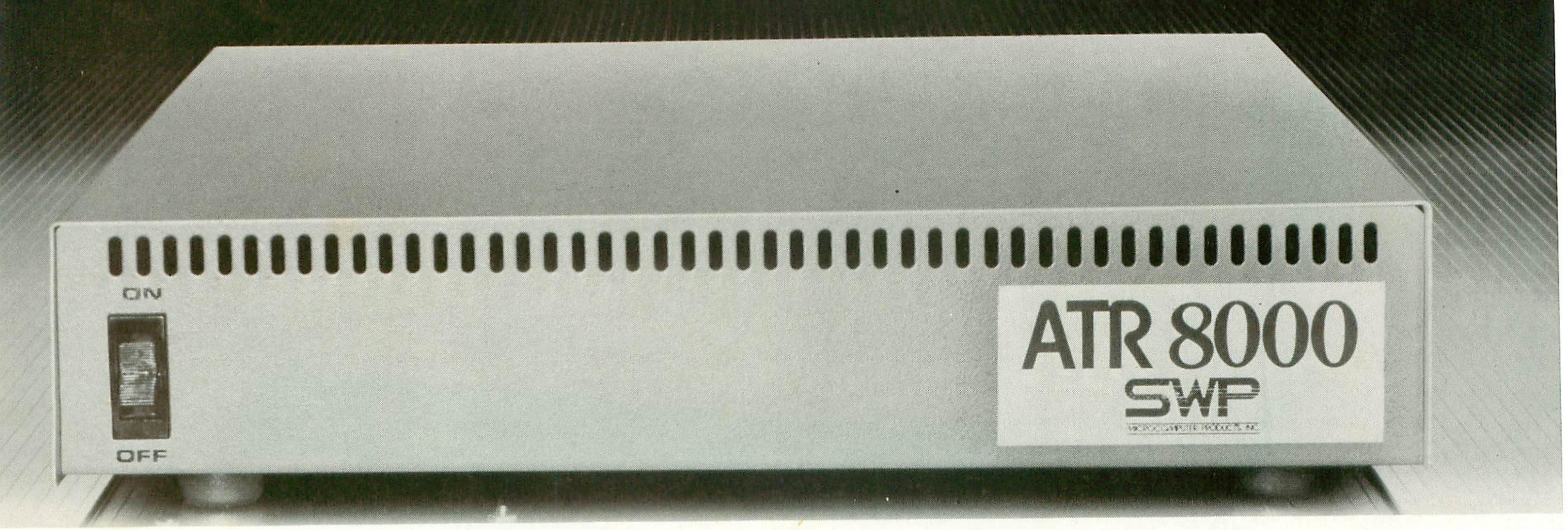
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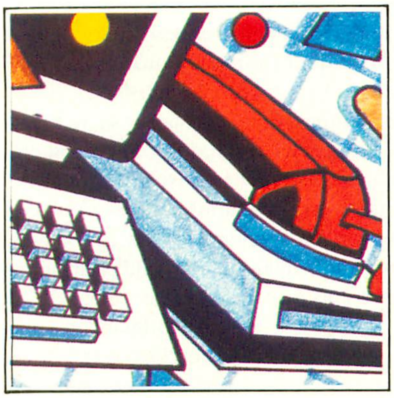
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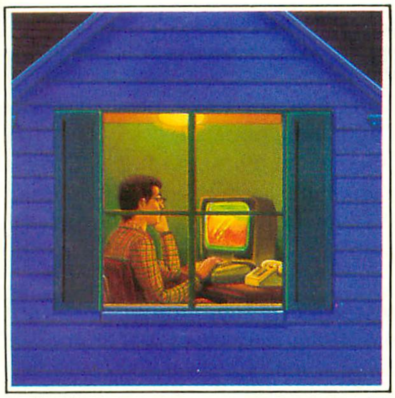
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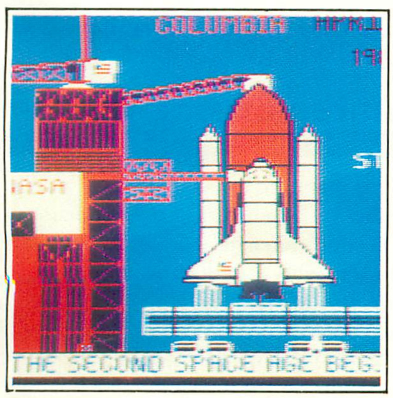
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i/o board

BREAK-KEY SHORTCUT

This program illustrates how to use the break-key vector to execute any short machine-language (M.L.) program at the touch of the [BREAK] key. It places the M.L. in Page 6, then tells the computer to execute the routine whenever the [BREAK] key is pressed by placing the routine's address in the break-key vector at locations 566 and 567. My sample M.L. routine changes the screen's color to black and the text's luminance to bright, and sets the screen's width to 40 columns. You can place your own routine in Page 6, if you wish. If [RESET] is pressed, you must POKE 566,0 and POKE 567,6 to restore the vector.

Since the Operating System built into Atari 400/800's manufactured prior to 1982 doesn't provide for a break-key vector, this technique will not work on these computers. PRINT PEEK(58383) will equal 56 in the old Operating System.

```
10 A=1536
20 READ C:IF C=999 THEN 40
30 POKE A,C:A=A+1:GOTO 20
40 POKE 566,0:POKE 567,6
60 DATA 169,0,133,17,141,255,2,141,
   240,2,133,77
70 REM  Your Subroutine
80 DATA 169,0,141,82,0,141,198,2,
   169,255,141,197,2,104,64,104,999
90 REM  (RTI)
100 DATA 104,64,104,999
```

Bruce Martin
Hanford, CA

THE OTHER SIDE

I'd like to respond to Mr. Garry Francis's criticism of our firm, Futuretronics, in his letter to "Atari Around the World" in the March 1984 issue of **Antic**.

The facts are as follows:

Futuretronics has seven service facilities throughout Australia, with a total of 22 qualified technicians and a support staff of 24. In addition, we will open a service center in Brisbane, Queensland, in 1984 with a staff of four.

In our current catalog, we list ten equipment manufacturers and seven software suppliers that support Atari computers.

About Antic's price: Currently (mid-March, 1984), the local Victorian Newsagent has copies of the November 1983 issue of Antic for $4.60. Our recommended, undiscounted price for an air-freighted (and much more current) copy of Antic is $6.00.

We at Futuretronics constantly strive to improve the service offered to our customers. Our qualified technicians use test equipment recommended by manufacturers. Our staff receives ongoing training, as well as the latest technical information, from both Atari International and our head office.

Brian Hodgkinson,
Service Manager
Futuretronics Australia
Pty. Ltd.
South Oakleigh,
Victoria 3167, Australia

Futuretronics has been an Antic distributor for two years. We have found them to be an excellent sales and service organization. —ANTIC ED

PRINTOUT PROBLEMS

I recently purchased an Alphacom 81 80-column thermal printer. It doesn't need an 850 Interface, and it works fine with most programs, but I can't obtain a printout from Atari's Home Filing Manager. Can you help?

B. Sonvico
North Bergen, NJ

Before you load Home Filing Manager, turn on your Alphacom printer and execute the following command from BASIC:

OPEN #4,8,0,"P:": PRINT #4;CHR$(27);"F"

This allows the printer to recognize and print all of the Atari's special characters, including inverse characters. You can then load and use Home Filing Manager as usual. Don't turn the printer off, though, or you'll have to re-execute the above command. —ANTIC ED

=ANTIC= NOTESFILE

Antic is planning to maintain an =antic= notesfile on Control Data Corporation's PLATO educational network. It will be open to all users who want to leave questions or comments. To sign on, type "b" for electronic mail, "n" for notesfiles, and "antic." See "PLATO Rising" in this issue for more information on the PLATO system.
—ANTIC ED

i/o board

DOWNLOADING WITH AN 835

I recently purchased the Atari Communicator II kit, which includes the Atari 835 modem and the TeleLink II cartridge. It works, but the documentation doesn't answer all of my questions. Is it possible to download a file from an information service or BBS with the 835? I don't have the 850 Interface.

Joe Cullen
Newport News, VA

Jim Steinbrecher, the author of AMODEM, a public-domain terminal program that is featured in this issue of Antic, offers a version of AMODEM that is customized to allow the Atari 835 and 1030 modems to upload and download. It is available as a download from Jim's ARCADE BBS at (313) 978-8087, or on disk (by mail). Send $10 to:

Jim Steinbrecher
37220 Tricia Drive
Sterling Heights, MI 48077

The Antic staff has been impressed by Jim's work, and this month's AMODEM program is a good example of what he has to offer.
—ANTIC ED

LOADING LODE RUNNER

I've had trouble loading the Broderbund game Lode Runner with my Rana 1000 disk drive. Finally, I discovered that if you let the title screen load, and then press [BREAK], the game loads fully.

Mark Smith
Oxnard, CA

STAR COMMANDER, CLASS 2

I heartily agree with your choice of Star Raiders ("Antic Pix Games," April 1984) as one of the best games ever produced for the Atari PC. However, I must respond to your doubt that anyone has ever completed the game's highest level. I finish 80 to 90 percent of the Commander-level missions I begin, and attain an average final rank of Star Commander Class 5. My highest ranking has been Star Commander Class 2. I'd be interested in hearing if any of your readers have reached the rank of Star Commander Class 1.

Carol Waskowski
Royal Oak, MI

ALL MIXED UP

I am 15, and love to read **Antic** every month. I've written a program that scrambles any word you enter (up to 99 characters).

```
10 DIM WORD$(99) ,WORD2$(99)
20 GRAPHICS 0
30 PRINT "ENTER YOUR WORD";:
   INPUT WORD$
35 IF WORD$ = "" THEN ? CHR$(253):
   GOTO 30
40 FOR I = 1 to LEN(WORD$)
50 X = INT(RND(0)*LEN(WORD$)) + 1
55 IF ASC(WORD$(X,X)) = 0 THEN 50
60 WORD2$(I) = WORD$(X,X)
65 WORD$(X,X) = CHR$(0)
70 NEXT I
80 ? :? "SCRAMBLED WORD IS ":?
   WORD 2$
90 ? :? "DO AGAIN (Y/N)  ";:
   INPUT WORD$
95 IF WORD$(1,1) = "Y" THEN 20
```

Rob Jasinski
Bloomingdale, IL

EXPANDING THE 600XL

I'm having trouble getting sufficient information on the best way to expand my 600XL. I want to use it to handle a large volume of data, but I don't necessarily need high processing or printing speed. I typically need to sort or alphabetize hundreds of medical and scientific literature references. Will I need two disk drives for this application? Also, my printer must be able to handle scientific graphs and histograms, and to arrange columns of output from BASIC programs.

I understand that peripherals using the parallel data bus may be helpful (when and if they become available), but right now the only actual port I can find on my computer is a serial port. Can you give me some clarification?

Donald F. Parsons, M.D.
Delmar, NY

Both the Atari 600XL and the 800XL have a parallel-bus connector in back. To date, the only peripheral available for this connector is a 64K RAM expansion board for the 600XL from Microbits Peripheral Products. In the future, we expect to see an expansion box that will let you plug in boards (like the Apple IIe) and attach parallel disk drives and other peripherals. This would significantly enhance the flexibility of the computer system. However, all current software for the Atari PC's uses serial I/O or the joystick interface.

For your particular application, two disk drives would be best and a good database program. We can recommend SynFile+ from Atari and Synapse Software or Microfiler from Microbits Peripheral Products.
—ANTIC ED

THE OLYMPIC SPIRIT

In the spirit of the 1984 Summer Olympics in Los Angeles, I've written a short program that displays the Olympic rings and prints a caption beneath them.

```
  5 TRAP 100
 10 GRAPHICS 8:COLOR 1:
    SETCOLOR 2,0,0
 20 R = 25:READ A,B
 30 X0 = -R:Y0 = 0:FOR X1 = -R TO R
 40 Y1 = INT(0.5 + SQR(R*R-X1*X1))
 50 PLOT A + X0,B-Y0:
    DRAWTO A + X1,B + Y1
 60 PLOT A+X0,B-Y0:
    DRAWTO A+X1,B-Y1
 70 X0 = X1:Y0 = Y1:NEXT X1:
    GOTO 20
 90 DATA 90,60,125,80,160,60,195,80,
    230,60
100 ? "      THE 1984 OLYMPICS"
```

John Barman
Bellevue, WA

S.P.A.C.E.

We read and enjoy every issue of **Antic**. Here's some information for your telecommunications issue: We run an Atari BBS called St. Petersburg Atari Computer Enthusiasts (S.P.A.C.E.). It runs on an Atari 400 with 48K, two 810 disk drives, an 820 printer and a Hayes Smartmodem 300. We offer a large selection of public-domain programs; all of them can be viewed by [V]isiting the library. The board is up from noon to midnight (E.S.T.) every day. The telephone number is (813) 344-3321.

H. Noel and
Kim Thomas
St. Petersburg, FL

Thanks for the kind words. We're happy to pass along this information, and hope to hear from other BBS's and BBS users.
—ANTIC ED

help!

RESISTOR TROUBLE

There are several errors in the list of resistors on page 68 of "Little Brother Grows Up" (**Antic**, April 1984), which describes how to add monitor and audio output to an Atari 400. However, the labels for the resistors in Figure 2, the schematic on page 106, are correct as published.

SOLUTIONS?

There is an inconsistency between the program "The Gantlet" (**Antic**, February 1984) and the "Solutions" given on page 73. The description of Room Nine says that you'll find two white squares upon entry, but you actually find 12 squares. The program is correct; the description is in error.

MR. WIZARD, MR. WIZARD . . .

The program listing for "Math Wizard" (**Antic**, April 1984) contains an error. In line 50, the 17th character in the string should be an inverse-video zero, rather than an inverse capital letter O. This error alters the listing's Typo Table—the code letters at line range 510–600 will be AJ rather than XW.

MATCHBOX MISTAKE

There is an error in the listing for "Matchbox Tic-Tac-Toe" (**Antic**, April 1984). If you load a file that contains patterns for the game and then attempt to save it, you get ERROR 129 (channel already open). To correct the problem, change line 2078 as follows:

```
2078 CLOSE #3: RETURN
```

Jeff Latkowski
Glendale Heights, IL

NOTE & POINT

There is an error in the listing for Jerry White's "Update Disks with NOTE And POINT" (**Antic**, April 1984). Line 160 should read:

```
160 GOTO 610
```

IN THE EYE OF THE BEHOLDER

Eric Verheiden's stock portfolio spreadsheet (**Antic**, "Follow That Stock," February, 1984) worked OK, but was downright obnoxious in its lack of user-friendliness. It had no initial message such as "Please wait . . . ," no title screen, poor error trapping, and a display bug, among other problems. I've eliminated these deficiencies in my version, but suggest that, in the future, Antic carefully review programs for such problems.

D. D. Davids II
Honolulu, HI

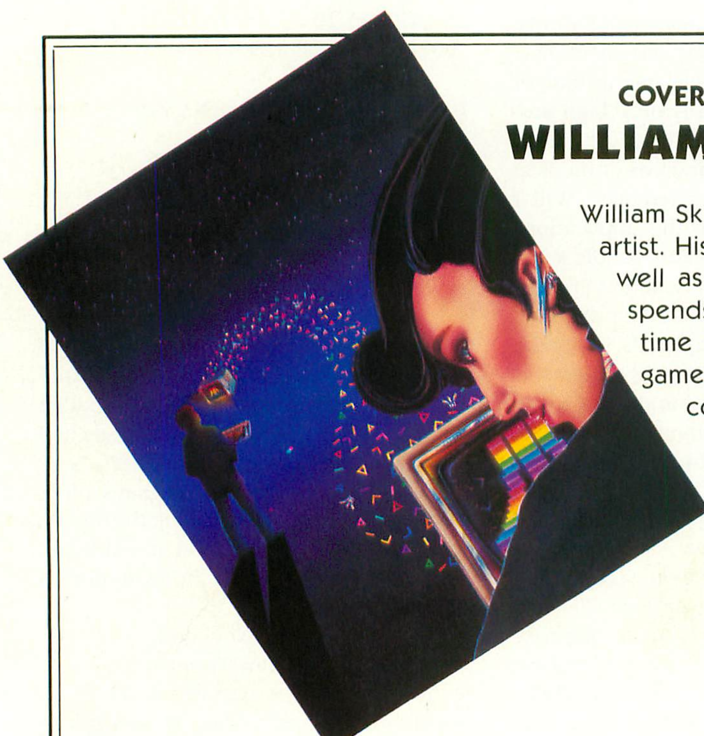
I originally wrote "Follow That Stock" for my father, a computer novice, and it went through several revisions before he was satisfied with it. People's taste regarding display formats inevitably varies; in this case, my primary consideration was producing readable output on the printer. The display bug can be fixed by changing line 1460 to 1465 and adding a new line 1460:

1460 IF VAL(S$) <.01 THEN S$ = "0.00"

As for error trapping, you can recover from most errors by typing GOTO 300.
—Eric Verheiden

We always carefully review programs. In this case we felt the unusual application warranted inclusion in Antic. We are continually on the lookout for new and unusual applications. Astrology, cryptoanalysis, genealogy and simulation studies just to name a few.

The programs that appear in our pages should be seen as works in progress. We encourage you to improve, correct and personalize them all. —ANTIC ED



COVER ARTIST
WILLIAM SKIRVIN

William Skirvin is a Bay Area artist. His heart is in art as well as in computers. He spends most of his free time playing computer games and working on computer graphics. Bill and family love their Atari.

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BUILDING BODIES WITH COMPUTERS

A revolution in Olympic training

by DAVID F. BARRY

The Atari-sponsored U.S. Women's Volleyball Team has found a new use for computers in its quest for a gold medal at the 1984 Summer Olympics: computerized exercise equipment. In earlier issues of **Antic** (February, March and April 1984), I've mentioned the coaching staff's use of the Atari 800 to calculate volleyball statistics and plot graphs, and Dr. Gideon Ariel's use of computers in his pioneering work in biomechanics. This third prong in the team's computer attack also involves the work of Dr. Ariel.

The computer equipment at the team's Coto de Caza training camp consists of an assortment of video monitors, CPU's, disk drives and video cassette recorders, all of which are connected to work stations designed by Dr. Ariel. These work stations consist of the exercise hardware the team members use in their exercise routines. They come in two models: the Multi-Function station and the Arm-Leg station. Both models are part of the "Ariel 4000 System."

THE BEAUTY OF AN INTELLIGENT MACHINE

Unlike dumbells, barbells or Nautilus equipment, which are truly "dumb" machines, Ariel's work stations provide immediate feedback to the exerciser, maintain and store data about workouts, and actually exert control over the exercising environment. "With my machine," Dr. Ariel notes, "the equipment adapts to you. Most exercise equipment forces you to adapt to it."

MEETING INDIVIDUAL NEEDS

Dr. Ariel's software and hardware were designed to accomplish a number of important functions. First, they provide a means of storing and quickly retrieving data about a workout. This includes such routine information as the amount of weight pressed on a weight-lifting machine, the number of repetitions, the number of sets, and so forth. The data is then saved by the athlete on a personal diskette, and is available whenever she is ready to work out again.

A second function of Dr. Ariel's equipment is to provide "variable resistance." This term is used in sports medicine to describe a method of weight training in which the force of a weight can be changed during the course of an exercise. With free weights or Nautilus equipment this is impossible; once a weight has been selected, it can't be changed until after an exercise repetition has been completed.

With Dr. Ariel's equipment, such variation is as easy as selecting items from a menu. If an athlete determines, for example, that the most beneficial workout for a particular set of muscles requires a heavy weight at the beginning of the lift, followed by a 10 percent reduction in the weight near the top of the lift, such a combination of choices can be made from the menu. This is done by the athlete in collaboration with her trainer. In this way, a workout can be designed to fit an athlete's individual needs.

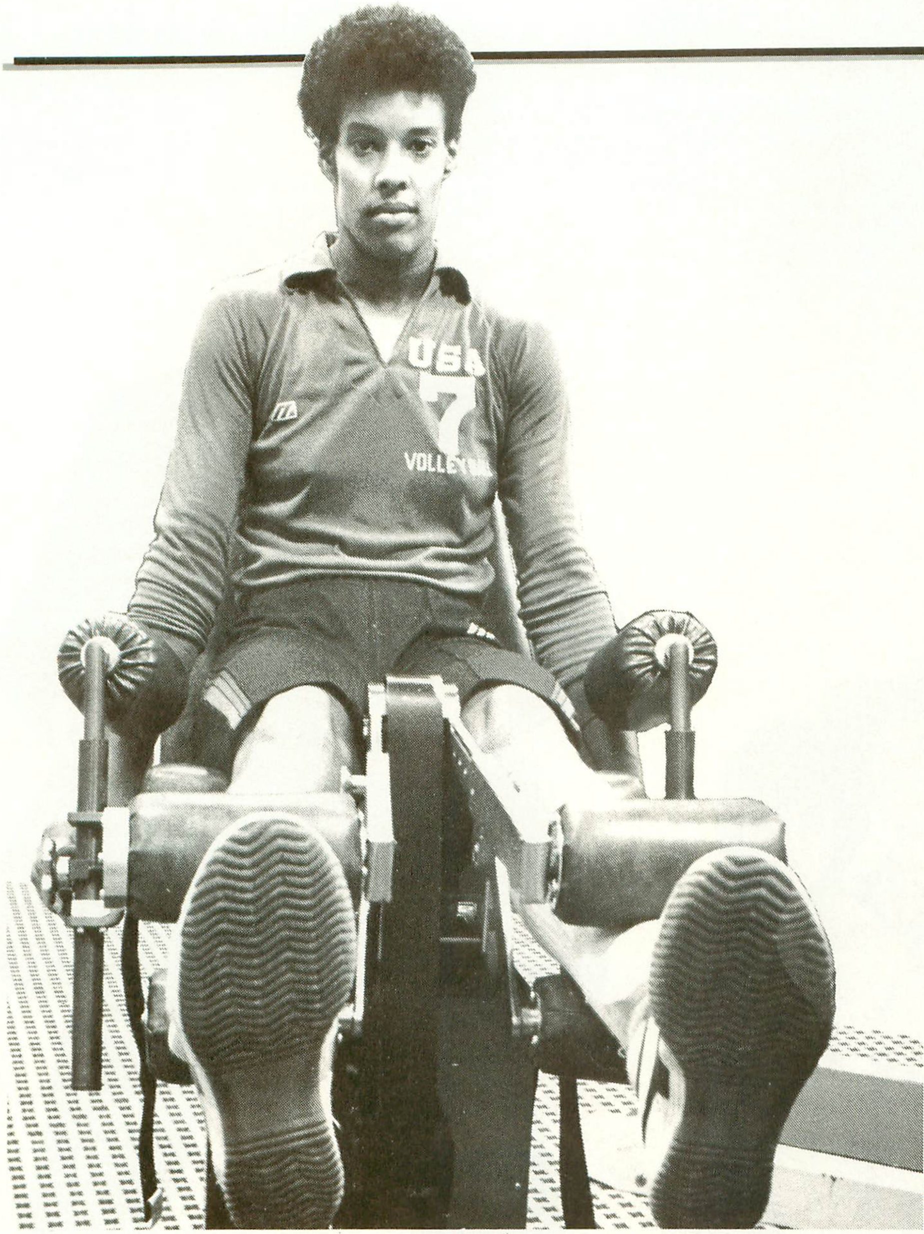
The computer interprets the numbers that the athlete inputs, and determines the amount of force needed at each point along the lift. It then instructs the athlete to begin. The athlete begins the press at the selected weight. Then, at a predetermined point, the computer senses the position of the bar and decreases the weight's force by 10 percent. The athlete feels this change, but is unaware of the many calculations and adjustments that were required to achieve it.

IMMEDIATE FEEDBACK

A third function of Dr. Ariel's work station is to provide immediate feedback about an athlete's performance on the equipment. This data is displayed on a video monitor as a colored graph, and includes variables such as force, velocity, and range of motion. The computer also emits sound cues that correspond to the strength of a particular effort. A strong effort evokes a high-pitched sound, while a weaker effort results in a cue of a lower pitch.

A SPECIALIZED REGIMEN

The major focus of any exercise regimen for volleyball athletes must be to strengthen the legs, so most team members use Dr. Ariel's Multi-Function



JOHN DROOYAN

Flo Hyman stretches out on Dr. Ariel's Arm-Leg work station.

station for leg squats and the Arm-Leg station for leg flexion exercises. The squat exercises are intended to increase an athlete's vertical jump capabilities — or the distance that she jumps straight up in the air. Effective spiking and blocking in volleyball require the ability to jump as high as possible.

The leg flexion exercises, on the other hand, are designed to increase the second essential ingredient in a volleyball player: endurance. Her legs and knees must be capable of withstanding a tremendous amount of punishment.

WORKING OUT

Dr. Ariel's equipment has been given quite a workout by members of the U.S. team; many of them work out on the equipment at least four times a week when they're not on the road. And the entire team recently used a seven-week program designed by Dr. Ariel to improve vertical jumping ability. The program, which consisted almost entirely of squat exercises done on the Multi-Function work station, was created for the entire team, but was also tailored for each individual athlete. Each woman stored personal data on her own diskette, including her standard routine, past efforts, weights pressed, number of repetitions, and various physiological factors. All of this data was immediately available at each workout.

The result? At the end of seven weeks, the average team member had gained an incredible five inches on her vertical jump!

REHABILITATIVE WORK

Dr. Ariel's work stations can also be very useful for the rehabilitation of injured athletes, because they allow specific sets of muscles to be exercised in very precise ways. For example, Rita Crockett, a key member of the team, was helped considerably by Dr. Ariel's technology when she injured her knee recently.

The injury was serious enough to require surgery, and her doctors anticipated that she'd be out of action for a number of months. Soon after her operation, however, Crockett began a rehabilitative program designed by Dr. Ariel, which consisted primarily of knee extension and flexion exercises. She worked out every day under Dr. Ariel's direction.

These highly individualized workouts directed the computer to adjust for range of movement, stress, the exercise level and the level of pain involved. The computer also monitored her progress. After only six weeks, Crockett was able to return to competition and to compete in a major tournament.

LOOKING FORWARD

With the Summer Olympics just weeks away, Dr. Ariel's work stations are busy every day, molding healthy bodies into stronger bodies and injured bodies into healthy ones. It's important work, because the U.S. team will need all the strength it can muster to defeat such formidable opponents as China and Japan, and to claim the first gold medal ever by a U.S. Women's Volleyball Team. And, of course, this technology has ramifications in the realms of physical fitness and rehabilitative medicine that extend far beyond the boundaries of this year's Olympic effort.

David F. Barry is a technical writer in the computer field, and the author of an upcoming book on the word-processing program Wordstar.

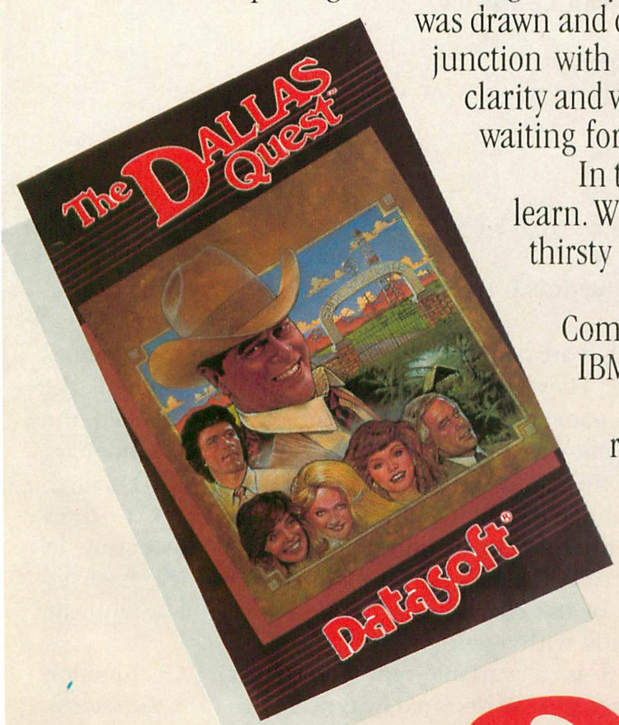


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LEARNING TO C

A programming language more powerful than BASIC

by THOMAS McNAMEE

Higher-level programming languages have traditionally been associated with large mainframe and mini computers, but they're now becoming increasingly available to microcomputer owners. These languages present the Atari owner with a wide array of problem-solving tools. The C language, in particular, is a fascinating and useful addition to any programmer's language library.

Since C is a compiled language, composition is fairly involved; the steps include editing, compilation, assembly and testing. Think of C as the next step above a macro assembler. Its operators, functions, and keywords handle a lot of the messier tasks of assembly-language programming, but the language itself doesn't hamper your ability to use the full power of your Atari.

Among the best features of the C language are the following:

- C compiles down to the machine-code level. It is engineered to produce compact, but not necessarily fast code. Even so, programs written in C typically run as much as ten times faster than equivalent programs in BASIC.
- It is designed for transportability. Although each compiler contains implementation-specific features, most programs are compatible with each other.
- It is extensible, and, in fact, has few intrinsic functions. Functions that are sensitive to their environment, such as I/O (input and output), are either written by the user or supplied with the compiler in the form of "libraries."
- Like macro assemblers, C encourages the creation of libraries of user-defined functions. These can be included in subsequent programs without rewriting.

THE BASICS OF C

C is a structured language. From a beginner's viewpoint, this is desirable, because programs in C are constructed of small, tested modules called functions. Functions are composed of statements, which can be made up of functions and/or expressions.

The C language also uses variables. Their declaration, syntax, and locality can be confusing to a beginning programmer, but, unless otherwise stated, they are "born" when and where they're created, and they "die" when they leave their home statement (where they were declared). Parameters are passed to functions, and results are returned to the calling functions. The following is an example of a function defined in C:

```
 1 /* LEN function */
 2 /*
 3 Call with:LEN(string)
 4 */
 5 LEN(BUFF)
 6 CHAR *BUFF;
 7 $(
 8 INT CNT;
 9 CNT=0;
10 WHILE (*BUFF+ + !=0)
11 + +CNT;
12 RETURN(CNT-1);
13 $)
```

Lines 1–4 are comment lines, and are similar to REM lines in BASIC. They are ignored by the compiler. Line 5 is the function-name declaration. The name to be assigned to the passed parameter is BUFF. Note that this name does not have to match the name of the string in BUFF when LEN is called; the variable name BUFF "lives" only inside LEN. C stores strings either as literals (in quotes) or in a CHAR array. In function calls, C passes only the address of the first character. The rest of the characters are stored sequentially, and the string ends with a zero.

Line 6 is a variable-type declaration. All function parameters must be declared by type. In this case, the asterisk preceeding the parameter name (BUFF) means that it is going to be used as a pointer to an array. The value of BUFF is the address of the array, and the value of *BUFF is the character that BUFF points to. Pointers such as this are powerful tools for string handling and array manipulation. The semicolon at the end of the line indicates that this is a complete statement.

Line 7 indicates that a group of statements is to follow. The $) in line 13 indicates the end of the group of statements.

Within this group of statements, a variable is needed to count characters. Lines 8 and 9 declare and initialize the variable CNT, which ceases to exist when it encounters the $).

Line 10 evaluates *BUFF to see if it points to the end-of-string zero. The != means "is not equal to," while the ++ means increment. When ++ precedes a variable, the value is taken *after* the increment. In line 10, however, the order is reversed, so the value is taken *before* the increment. Because of this, *BUFF always points to the next character.

Line 11 increments CNT if the character pointed to by *BUFF does not equal zero. In line 12, RETURN returns the value in parentheses to the calling routine. Since the value of CNT includes the trailing zero, we decrement it by one before returning. Line 13, which contains the closing delimiter, indicates the end of the function.

C/65 BY OSS

I use a C implementation called **C/65**, which is produced by Optimized Systems Software (OSS). It's a "small C," or a subset of the C language used on larger computers. Some of C's best features, such as "for" and "switch" statements, are missing from this implementation, and only "char" (eight-bit) and "int" (16-bit) data types are allowed.

Since C/65 produces assembler source code, OSS's **MAC/65** assembler is necessary to assemble the source and create an executable object file. This assembler is expensive, but it is a powerful macro assembler, text editor and debugger, so you get your money's worth. The documentation for C/65 and MAC/65 amounts to almost 300 pages of text, and all of it should be read carefully.

However, if you really want to get into C, you'll need to do more reading and research. I've found that **The C Programming Language** by Kernighan and Richie is one of the best reference books on the subject. It's a bit advanced for the beginner, though, so I also recommend that you read **The C Primer** by Hancock and Krieger, which is written for the beginning C programmer. It takes a while to get the hang of C, but once you've built a good foundation you'll find that it's easy to learn the rest. And well worth your time and effort.

Thomas McNamee is a software engineer for ManTech International in Alexandria, Virginia. He programs in FORTH, C, BASIC and 6502 assembly language, and has written for a number of computer publications.

CALL ME MODEM

Communications by computer

by SUZI SUBECK

In case you hadn't noticed, the realms of personal computing and communications have discovered each other, and — as a result — neither will ever be the same again. Today, with a modem, an Atari personal computer (PC), a telephone and the appropriate software, you can hook up to a giant network of free, public-access bulletin board systems (BBS's) that spans the U.S. Approximately 100 of these are Atari-specific. Each BBS brings people with common interests together by giving them the opportunity to exchange ideas, information, and public-domain software.

The rapid growth of public-domain bulletin boards for home users has taken away some of the appeal of expensive, commercial systems, such as **CompuServe** and **The Source**, which require users to pay an initial membership fee plus hourly charges for on-line use. These systems use massive mainframe computers to cater to business and industry. They provide their clientele with access to an extensive news and information network, which includes data such as up-to-the-minute stock market reports, sports scores and even the news reported by the daily *New York Times*.

Many Atari home computerists have subscribed to services such as CompuServe because they offer on-line games and access to special interest groups such as SIGATARI. Now, however, something both cheaper and friendlier can offer many of the same services. Although many Atari users purchase modems in the first place to download the abundant free, public-domain software that is available from BBS's, they quickly discover that most boards have quite a bit more to offer.

A BBS is run on a remote machine, which is known as the "host," or the "host computer." You access the host computer via normal telephone lines (whether local Bell, long-distance AT&T or other local or long-distance services). To link your Atari to a BBS, you'll need to use a modem (MOdulator–DEModulator). This device translates your computer's digital signals to sound waves that can be transmitted over the phone lines, and vice-versa. Most modems require the presence of an RS-232 (standardized serial) interface between the computer and modem. The Atari 850 Interface Module provides the RS-232 interface for Atari computers.

If your finances are tight, however, it's possible to do without the 850 by using special terminal software and connecting the modem directly to the computer through one of the joystick ports. Two such modems are the **MPP-1000C** from Microbits Peripheral Products, and **Volksmodem** from Anchor Automation.

Your computer needs a terminal program to activate and control the modem. AMODEM, a popular and useful terminal program, appears in this issue for your convenience. AMODEM incorporates the XMODEM protocol, which greatly simplifies file transfer between two computers. Many CP/M bulletin boards use the XMODEM protocol, so you'll have access to many types of previously unavailable programs. XMODEM protocol also functions as an error-checking system. It reads a program one sector at a time as it enters the buffer, and allows up to ten retries if a sector is not read properly.

BBS SPONSORSHIP

Local computer store owners or Atari users' groups sponsor most Atari bulletin board systems. These organizations provide area Atari owners with a valuable measure of user support, because a BBS is an excellent source of information and advice about using your Atari PC.

Occasionally, BBS's are run by individuals out of their homes or offices, but this is unusual due to the special demands of sponsoring such a system. After all, regardless of sponsorship, a BBS requires a certain amount of daily maintenance, and needs a "sysop," or system operator, to keep it running smoothly.

Sysops update message files, rotate uploads and downloads, and answer users' questions. In addition, most sysops try to find some time each day for on-line "chats" with willing callers.

In the same way that the terminal software operates the resident computer (the one that makes the call), BBS software operates the host (or answering) computer. In contrast to the large number of available Atari terminal pro-

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ILLUSTRATION: PETE McDONNELL


McDONNELL

grams, there are fewer than half a dozen BBS programs from which to choose. Most Atari BBS's are run with AMIS (Atari Message and Information Service). Because AMIS software is in the public domain, sysops freely modify and upgrade it. As a result, even a newcomer to the field of Atari telecommunications will find AMIS boards to be very user-friendly. They don't use passwords, and their Command Menus are easy to use.

The typical AMIS Command Menu looks like this:

A = ASCII/ATASCII switch
B = Bulletins
C = Chat with Sysop
D = Download
E = Enter Message
F = File Directory
G = Good-bye
I = Information about System
P = Full/Half Duplex Toggle
Q = Quick Scan of Messages
R = Retrieve Messages
S = Scan Messages
U = Upload
X = Expert Mode
? = Reprints this list

AMIS COMMANDS

The ASCII/ATASCII switch affects only what is seen on the screen. The "A" command toggles the board between the two modes. If the host is in ATASCII, the resident should be in ATASCII, too.

The "C" command pages the sysop, but the caller can continue to use the board even if the sysop is not available.

The "D" command allows you to receive — or download — a file.

The "F" command prints the list of files available for downloading. Always use the "F" command before the "D" command, because a BBS's download menu can change daily.

The "Q" command scrolls a list of current message titles across the screen.

The "S" command scrolls the title, date, sender and recipient of the message.

The "R" command allows you to retrieve specific messages.

The "E" command lets you post a message on the BBS. This message can be addressed to a specific person, or to "ALL." In either case, once the message is posted any caller is free to read it.

The "U" command allows you to send — or upload — a file transfer.

SPECIAL FEATURES

A number of sysops have personalized their AMIS Boards to include quick sign-on features, or detailed information about available downloads. Because of this, the wise caller will read through the Command Menu the first time he or she signs on to a system.

Every Atari BBS features a message area which allows users to share information. New callers often pose questions; experienced callers respond. There are offers to sell or trade equipment and software — and many good buys are there for the asking! Best of all, new friendships develop daily because of these exchanges.

Most Atari BBS's maintain a list of other bulletin boards. These can be captured to buffer and then dumped to tape, disk or a printer. Such a list can either be included with the available downloads, or can be accessed with the "O" command.

You may get a list of boards within a certain calling range, or a list that includes only Atari-specific boards. It is impractical to list all known BBS's in the U.S., because such a list would exceed your available buffer space and would inevitably be somewhat out-of-date.

A WEALTH OF ATARI BULLETIN BOARD SYSTEMS

ST	PHONE NUMBER	NAME	PSWD	HOURS	COMMENTS
AL	205-979-0512	BACE	NO	EVENING	
CA	213-766-3634	CKPBZM	?	24 HR	TROUBLE WITH LOGON
CA	408-253-5216	GFX	NO	24 HR	EXCEPTIONAL—DO CALL
CA	408-732-1079	VANVSN	?	24 HR	
CA	408-578-2390	BAUG	YES	24 HR	
CA	619-447-8143	SDACE	NO	9PM–4AM	MON. THRU THURS. ONLY
CA	714-781-8774	AFAC	NO	24 HR	
CA	805-544-8173	SLOPOKE	NO	24 HR	NICE CLUB-RUN BOARD
CA	805-922-6630	LSMAUG	NO	6PM–10AM	
CA	818-760-8515	ELITE	YES	DAYTIME	SOFT SYNDICATE[1]
CA	818-766-3634	COMPKID	YES	24 HR	SOFT SYNDICATE
CA	916-363-3304	ACCESS	?	24 HR	KEPT HANGING UP
CO	303-758-2927	GCP	NO	24 HR	EXCEPTIONAL SYSTEM
GA	404-252-9438	RODR	NO	24 HR	NICE SYSTEM
IA	515-961-8881	MIDAMER	NO	24 HR	
IL	217-235-2000	ICTC	NO	24 HR	LOTS OF D/L[2]
IL	312-544-7228	SCAT	NO	24 HR	SYSOP MOST HELPFUL
IL	312-789-0499	RCPM	YES	24 HR	210+ D/L ON DRIVE F:2
IL	312-889-1240	CLAUG	NO	24 HR	2 DBL DENSITY DRIVES
IL	312-925-2929	WZ BNG	YES	24 HR	ONE OF THE BEST
IL	312-335-1652	FDAI	NO	EVENING	
IL	312-678-1617	GLCTIC	YES	24 HR	FEATURES CONTESTS ETC
IL	312-945-0377	SHWDFRS	YES	24 HR	
IN	219-738-7282	ALIEN	NO	9PM–9AM	LOTS OF D/L
IN	219-262-3980	HARTCTY	NO	24 HR	
LA	504-273-3116	RBBS	NO	24 HR	LARGE SYSTEM
MA	617-266-7789	BSTBULT	NO	24 HR	GREAT RCPM[3]
MA	617-444-5401	KINGCST	NO	24 HR	
MA	617-667-7388	MACROEX	NO	24 HR	1200 BAUD OPT
MA	617-595-0211	NO. SHR	NO	24 HR	1200 BAUD OPT
MD	301-974-4987	SEVPK	YES	24 HR	
MI	313-368-4828	PLGRND	NO	EVENING	
MI	313-544-0885	MACE	NO	24 HR	
MI	313-274-3940	MACEW	NO	24 HR	
MI	313-538-0197	DARTBD	NO	LATE NITE	
MI	313-978-8087	ARCADE	NO	24 HR	GOOD BBS LIST
MI	313-427-1402	CAPKIRK	YES	24 HR	ON-LINE SHOPPING
MI	313-547-7903	CPUAPAT	NO	24 HR	
MI	313-623-1089	TBBS	NO	24 HR	
MI	313-776-9792	SOFTHSE	NO	24 HR	ON-LINE SHOPPING

ST	PHONE NUMBER	NAME	PSWD	HOURS	COMMENTS
MI	616-241-1971	GRASS	NO	24 HR	
MO	314-928-0598	AURA	NO	24 HR	
MO	816-587-9543	ANTWAR	YES	24 HR	
MO	816-252-4467	COMPSTP	YES	24 HR	
MO	816-461-7635	CARNVAL	YES	24 HR	
NJ	201-533-9377	ATLANTS	YES	24 HR	
NY	212-927-6919	DANTINF	YES	24 HR	
NY	212-464-3434	CRYPT	YES	24 HR	DANDY-NET
NY	212-357-4112	ATARINN	YES	24 HR	DANDY-NET
NY	212-241-8965	SPIWEB	NO	24 HR	
OH	216-439-5534	NOCOAST	YES	EVENING	NICE D/L
OK	405-495-2718	UNDGRND	YES	24 HR	SOFT SYNDICATE
OK	405-681-4024	UNONSNA	YES	24 HR	SOFT SYNDICATE
OK	405-722-5056	GREKCOM	NO	24 HR	NICE LARGE SYS
OR	503-343-4352	ACE	NO	24 HR	GREAT LARGE SYS
PA	215-333-3753	JRBBS	NO	24 HR	
PA	412-754-0800	PACE	NO	24 HR	
TX	512-837-2003	ARMADLO	NO	24 HR	
TX	817-534-4346	STARWRS	YES	9PM–6PM	ADVENTURE-LIKE
TX	817-595-3195	COMPTLK	YES	24 HR	
VA	804-722-0935	PACEWRD	NO	?	
WI	414-355-6031	MILTARI	NO	24 HR	

I have not tested the following BBS's myself, but these numbers appeared on an information sheet (updated as of January 1984) from Atari User Group Support:

AK	907-456-1677	FAIRBANKS	
AR	501-646-0197	FT. SMITH	
CA	213-783-8373	ENCINO	
CO	303-758-6223	ARVADA	
DC	202-726-8342	DISTRICT OF COLUMBIA	
ME	207-839-2337	GORHAM	
NJ	201-377-4084	HIGH BRIDGE	
NJ	609-234-9240	VINCENTOWN	
NC	919-822-4949	FAYETTEVILLE	
OR	503-245-9405	PORTLAND	
PA	215-836-5116	PHILADELPHIA	5PM–8AM
TX	817-532-2981	W. FT. WOOD	6PM–6AM
VA	804-898-7493	HAMPTON	
WA	509-624-2636	SPOKANE	8PM–6AM

1. Name of BBS's sponsor. 2. Down-load material. 3. Remote CP/M.

Many sysops update their BBS lists four to six times a year, and regular callers help keep them informed, but nonetheless BBS's appear and disappear daily. Although this is frustrating for a newcomer, just stick with it — seasoned callers are immune!

Some sysops divide the message areas of their boards into special interest groups (SIG's). One SIG may be set aside for fans of text adventures, one for those interested in current computer events — such as upcoming computer shows and user club meetings — and another for users who are looking for computer-related jobs. Atari BBS's usually offer their users the chance to help one another while helping themselves.

GETTING INVOLVED

Whatever you want from a BBS is probably out there somewhere. Just be prepared to live through some unexpected adventures while trying to find it! Beware, though. Home telecommunications is a highly addictive hobby that often claims its victims in the wee, small hours of the morning. While the rest of the world is sound asleep, hard-core modem users are fighting it out in the Battle of the Busy Signal!

The list of Atari BBS's included here should help save wear and tear on your eyes and telephone. I've contacted each number within the past several months and believe that each BBS listed is strong and functional, and will continue to operate well beyond the time you read this.

Finally, here are three tips to help you bridge the communication gap:

1) Keep this list close to your modem for ready reference, along with future updates that will appear in **Antic**.

2) Remember that evening hours are prime time in the world of telecommunications. Call during the day if at all possible.

3) Use a long-distance network such as Sprint or MCI if you plan to make a large number of long-distance calls. Otherwise, your enormous phone bills will lead you to wonder why you ever looked at a modem.

MORE TO COME

This is the first in a regular series on home telecommunications and the Atari PC's. In coming months, I'll explore additional aspects of free, public-domain BBS systems: tell you about "specialty" boards that feature on-line games, multiple job listings, X-rated jokes, and matchmaking questionnaires; keep you up-to-date on new hardware and software products; and explain how to use message areas more effectively, download without XMODEM, operate CP/M boards and more.

Sysops can help **Antic** keep its list of BBS's up-to-date by sending information about their systems to me, Suzi Subeck, c/o Antic Magazine, 524 Second Street, San Francisco, CA 94107. We'll do our best to keep the list as timely and accurate as possible.

Suzi Subeck was convinced by her husband Stan and two children — Lisa, 12, and Scott, 11 — to get seriously involved in Atari computing and telecommunications. As a result, she's been editing a newsletter for Computer Squad, an Atari computer users' group in the southern suburbs of Chicago, since last September. In addition, she started her own BBS in March of this year. This is the first series of articles on Atari telecommunications. Other articles in the series will appear in our new Communications Department in upcoming issues.

Everybody Needs AMODEM

A terminal program for your Atari

by JIM STEINBRECHER

AMODEM is a terminal program that, along with your Atari computer, a modem and an interface module, allows you to access all public bulletin boards, as well as time-sharing information services such as **CompuServe** and **The Source**. It features XMODEM protocol for easy uploading and downloading from many Atari and CP/M bulletin board systems (BBS's). XMODEM, written by Ward Christensen, is the only protocol that can be used to download tokenized BASIC (SAVEd) and binary files.

To use AMODEM, type in the program and SAVE an extra copy as a backup. Then check for typing errors with TYPO (see "What Is a Typo Table?"). Before you RUN this program, you must load an RS-232 handler to provide a serial interface between your Atari and modem. Make sure that your 850 Interface is turned on, and boot your Master Disk with BASIC installed.

If you turn your TV volume up, you should be able to hear a one-second beep just before the READY prompt appears. This indicates that the RS-232 handler has been loaded. At this point, you can LOAD and RUN AMODEM. It takes a few seconds to initialize, after which the screen turns a darker shade of blue and the cursor appears.

To access a list of AMODEM's functions, press [SELECT]. To choose a function, press the letter that corresponds to the letter highlighted in the name of the function you want to use. Note that this isn't always the first letter in the function's name.

SYNOPSIS

AMODEM 4.2, a public-domain terminal program, requires 16K RAM for cassette and 24K RAM for disk use. To use it, you'll also need a modem, an Atari 850 Interface Module or equivalent, and Atari BASIC. It runs as is on all Atari computers, but cassette users must change the 400 in line 10000 to 2100.

PROGRAM FEATURES

R — Receive. Use this function to download files from another Atari or from a BBS that uses XMODEM protocol. If you're downloading from an Atari BBS that uses XMODEM, you'll be asked if you're using this protocol. Answer "Y" for yes. If you and a friend are transferring files between two Atari computers, both of you should be using AMODEM.

After you press [R], you'll be prompted to enter a file specification for the file to be downloaded. The file specification must include the device name and, if applicable, a file name (e.g., "D:FILENAME"). If you're using cassette, just type "C:". After you answer the prompt, the file is opened immediately, so make sure that your storage peripheral and media are properly prepared. Once you're back in terminal mode, simply press [START] (as prompted by the BBS) if everything is okay.

The rest of the download is automatic: the screen turns red and the file is received in 128-byte blocks. When the transfer has been completed, the file is saved, the screen turns blue, and you're returned once again to terminal mode.

U — Upload. This function allows you to send files to another system that uses XMODEM protocol. The procedure is similar to that for downloading (see R above). After pressing [SELECT] and [U], respond to the prompt for an upload file specification, and AMODEM will read the file from the appropriate peripheral. Once you're back in terminal mode, press [START] and the file will be automatically transmitted.

C — Capture. Use this function to download from a system that doesn't use XMODEM protocol, or simply to save received text. After pressing [SELECT] and [C], type in a file specification. If you press [OPTION] at this point, the screen turns black and the data you receive is printed to the screen and saved to the capture buffer.

You can toggle the capture feature on and off with the [OPTION] button to save selected portions of a transmitted text. If you want to clear the capture buffer without saving it (while retaining the file specification you originally noted), press [START]. When you've finished capturing the information you're after, press [SELECT], and then [D], and the data will be "dumped" to the file you previously specified.

S — Send. Use this function to upload to a system that doesn't use XMODEM protocol. After you press [SELECT] and [S], type in a file spec and

continued on next page

wait for it to be loaded into the buffer. When you're ready to send, press [START].

T — Translation. This toggles between ATASCII (no translation) and ASCII (light translation) formats. Use ATASCII for hookups with Atari BBS's or between two Atari computers, and ASCII with all other systems. You must be in ATASCII to download or upload an Atari machine-language or tokenized BASIC file.

P — Duplex. Use half duplex between two Atari computers, and full duplex for all others.

M — Menu. Use [M] to get a directory listing from all on-line disk drives. For a directory from only one disk drive, press the appropriate number (1–4).

B — Baud. AMODEM's default baud rate is 300. Use [B] to change this to either 600 or 1200 baud. You can use 1200 baud only for normal operation and with the Capture function — BASIC is too slow to handle the others.

D — Dump. See Capture above.

Jim Steinbrecher runs a very popular BBS called A.R.C.A.D.E. at (313) 978-8087.

```
1Ø REM AMODEM4.BAS:VER 4.2
12 REM BY JIM STEINBRECHER
14 REM ANTIC MAGAZINE
2Ø GOTO 1ØØØØ
1ØØØ TRAP 1ØØØ:GOSUB 13ØØØ:? :? " OPTI
ON  = TOGGLE MEMORY SAVE"
1Ø1Ø ? " SELECT  = (ABORT,B,C,D,M,P,R,
S,T,U)"
1Ø2Ø ? " START   = START TRANSMISSION"
1Ø3Ø SETCOLOR 2,7,2:C$=CHR$(SRFLAG):IF
 SRFLAG=ZERO THEN C$=" ":FILE$=C$
1Ø4Ø ? C$;" FILE    = ";FILE$:?
1Ø42 IF  NOT TRN THEN ? "*** ASCII";
1Ø44 IF TRN THEN ? "*** ATARI";
1Ø46 ? " TERMINAL MODE ***"
1Ø5Ø ADDR=USR(ADR(IO$),ADDR,LEN(BUFF$)
+ADDR-1)
1Ø55 C=PEEK(7Ø6):IF C=8 THEN PUT #MODE
M,19:? "*** BUFFER FULL ***":GOTO 17ØØ
12ØØ IF C=6 THEN 5ØØØ
121Ø IF C=5 THEN 6ØØØ
122Ø IF C<>3 OR SRFLAG<>67 THEN GOTO T
ERM
123Ø MSAVE=WON-MSAVE:POKE 7Ø4,MSAVE:?
:? "Capture ";
124Ø IF MSAVE THEN SETCOLOR 2,Ø,2:? "O
n ";
125Ø IF  NOT MSAVE THEN SETCOLOR 2,7,2
:? "Off ";
126Ø ? ADDR-BUFF;" BYTES"
127Ø IF PEEK(CON)=3 THEN 127Ø
128Ø GOTO TERM
15ØØ ? :? "*** NEW CAPTURE FILE ***"
151Ø ? "*** SELECT D WILL SAVE IT!***"
152Ø ADDR=BUFF:GOSUB 13ØØØ
153Ø SETCOLOR 2,Ø,2:POKE 766,1
154Ø MSAVE=1:POKE 7Ø4,MSAVE:GOTO TERM
17ØØ ? :CLOSE #MODEM:IF ADDR<=BUFF THE
N ? "*** BUFFER IS EMPTY ***":GOTO 176
Ø
171Ø TRAP 176Ø:? "*** SAVING MEMORY **
*"
172Ø OPEN #FILE,8,ZERO,FILE$
173Ø OBJ=1:IF TRN THEN OBJ=Ø
174Ø POKE 1536,OBJ
175Ø C=USR(161Ø,BUFF,ADDR)
176Ø MSAVE=ZERO:POKE 7Ø4,MSAVE:ADDR=BU
FF:L$=""
179Ø SRFLAG=ZERO:GOTO MENU
2ØØØ TRAN=32:GOSUB IO:A=NAK:POKE 766,1
2Ø1Ø SETCOLOR 2,4,2:BLOCK=ZERO
2Ø2Ø ? :? "*** RECEIVING ";FILE$;" ***
"
23ØØ POKE 77,ZERO:FOR TRY=WON TO ERRTR
Y-WON
231Ø ? :? "*** GETTING SECTOR ";BLOCK+
WON;"/";TRY;" ***"
2315 IF PEEK(CON)=5 THEN A=CAN
232Ø PUT #MODEM,A:A=ACK
233Ø GET #MODEM,SH:SUM=SH:IF SH=EOT OR
 SH=CAN THEN 238Ø
234Ø GET #MODEM,C:SUM=SUM+C:GET #MODEM
,C:SUM=SUM+C
235Ø ADDR=BLOCK*128+BUFF:FOR BLK=Ø TO
127:GET #MODEM,C:POKE ADDR+BLK,C:? CHR
$(C);:SUM=SUM+C:NEXT BLK
236Ø GET #MODEM,C:SUM=ASC(CHR$(SUM)):I
F C=SUM THEN 238Ø
237Ø A=NAK:FOR C=WON TO 4ØØ:NEXT C:GOT
O 239Ø
238Ø TRY=ERRTRY
239Ø NEXT TRY:BLOCK=BLOCK+1
25ØØ IF SH=EOT AND A=ACK THEN 28ØØ
251Ø IF SH=CAN OR A<>ACK THEN 29ØØ
253Ø GOTO 23ØØ
28ØØ PUT #MODEM,ACK:? :? "*** SAVING F
ILE ***":TRAP 286Ø
28Ø5 C=PEEK(ADDR+127)
281Ø FOR A=ADDR+C TO ADDR+127:IF PEEK(
A)<>C THEN C=128
2812 NEXT A:ADDR=ADDR+C:CLOSE #MODEM
282Ø OBJ=ZERO:A=PEEK(BUFF):IF A>ZERO A
ND A<255 THEN OBJ=WON
2825 A=ZERO:IF FILE$(1,1)="C" AND OBJ=
ZERO THEN A=128
283Ø IF TRN THEN OBJ=ZERO
284Ø POKE 1536,OBJ:POKE 195,WON:? "***
 ";ADDR-BUFF;" BYTES"
285Ø OPEN #FILE,8,A,FILE$:C=USR(161Ø,B
UFF,ADDR)
286Ø GOTO 299Ø
29ØØ ? :? "*** UNABLE TO RECEIVE FILE"
:A=NAK
291Ø PUT #MODEM,CAN
299Ø SRFLAG=ZERO:GOTO MENU
3ØØØ TRAN=32:GOSUB IO:POKE 766,1
3Ø1Ø SETCOLOR 2,WON,2:BLOCK=ZERO:BYTE=
BYTES
```

```
3020 ? :? "*** SENDING ";FILE$;" ***"
3300 POKE 77,ZERO:FOR TRY=WON TO ERRTR
Y
3310 ? :? "*** SENDING SECTOR ";BLOCK+
WON;"/";TRY;" ***"
3320 PUT #MODEM,SOH:SUM=ZERO
3330 PUT #MODEM,BLOCK+WON
3340 PUT #MODEM,254-BLOCK
3350 ADDR=BLOCK*128+BUFF:FOR BLK=0 TO
127:C=PEEK(ADDR+BLK):PUT #MODEM,C:? CH
R$(C);:SUM=SUM+C:NEXT BLK
3360 SUM=ASC(CHR$(SUM)):PUT #MODEM,SUM
3370 GET #MODEM,A:IF A=CAN OR PEEK(CON
)=5 THEN 3900
3380 IF A<>ACK THEN 3400
3390 TRY=ERRTRY
3400 NEXT TRY:BLOCK=BLOCK+1
3500 IF A<>ACK THEN 3900
3510 BYTE=BYTE-128:IF BYTE>ZERO THEN 3
300
3800 PUT #MODEM,EOT:PUT #MODEM,ZERO
3810 ? :? "*** TRANSFER COMPLETE ***"
3820 GOTO 3990
3900 ? :? "*** UNABLE TO SENDFILE ***"
3910 PUT #MODEM,CAN
3990 GOTO MENU
4000 ? :CLOSE #MODEM
4010 FOR C=49 TO 52
4020 L$="D1:*.*":L$(2,2)=CHR$(C)
4030 TRAP 4060:OPEN #FILE,6,ZERO,L$:?
L$:TRAP 4050
4040 INPUT #FILE;L$:? L$:GOTO 4040
4050 ?
4060 TRAP 4065:CLOSE #FILE
4065 IF DR=WON THEN 4080
4070 NEXT C
4080 DR=ZERO:L$="":GOTO MENU
4500 POKE 766,WON:SETCOLOR 2,2,2:? :?
"*** UPLOADING ";FILE$;" ***"
4510 FOR I=BUFF TO BUFF+BYTES-129+BYTE
4520 PUT #MODEM,PEEK(I):IF PEEK(CON)=5
 THEN ? :? "*** ABORTED ***":GOTO 4550
4530 STATUS #MODEM,C:BLK=PEEK(747):IF
BLK THEN FOR A=WON TO BLK:GET #MODEM,C
:? CHR$(C);:NEXT A
4540 NEXT I
4550 FOR I=1 TO 100:NEXT I
4560 STATUS #MODEM,C:IF PEEK(747) THEN
 GET #MODEM,C:? CHR$(C);:GOTO 4560
4570 ? :? "*** UPLOAD COMPLETE ***":GO
TO MENU
5000 IF SRFLAG=67 THEN 1500
5010 IF SRFLAG=82 THEN 2000
5020 IF SRFLAG=83 THEN 3000
5030 IF SRFLAG=85 THEN 4500
5040 ? :? "*** MUST SELECT FIRST! ***"
5050 IF PEEK(CON)<>7 THEN 5040
5060 GOTO TERM
6000 ? :? " Baud, Capture, Dump, Menu
or 1-4,":? " duPlex, Receive, Send,":?
 " Translation, Upload ?";
6010 CLOSE #MODEM:GET #KEY,C:C$=CHR$(C
):? C$
6012 IF C$="B" THEN 9900
6015 IF C$="C" THEN 7000
6020 IF C$="D" THEN 1700
6025 IF C$="U" THEN 8000
6030 IF C$="M" THEN 4000
6035 IF C$="R" THEN 7000
6040 IF C$="S" THEN 8000
6045 IF C$="T" THEN TRN=32-TRN:IF SRFL
AG>82 THEN SRFLAG=ZERO
6050 IF C$="P" THEN PLX=1-PLX:POKE 705
,PLX
6055 DR=0:IF C>48 AND C<53 THEN DR=WON
:GOTO 4020
6060 GOTO MENU
7000 SRFLAG=ZERO:MSAVE=ZERO:? :? "***
RECEIVE FILESPEC ";
7010 INPUT L$:IF L$="" THEN 7090
7015 TRAP 7000:IF L$(2,2)<>":" THEN IF
 L$(3,3)<>":" THEN ? "SPECIFY DEVICE!"
:GOTO 7000
7020 FILE$=L$:IF L$(1,1)<>"D" THEN 708
0
7030 TRAP 7080:OPEN #FILE,4,ZERO,FILE$
7040 ? :? "*** HAVE FILE ";FILE$
7050 ? "*** Type (Y) to ERASE ";FILE$;
" ";
7060 GET #KEY,A:? CHR$(A):IF A<>89 THE
N L$="":GOTO 7090
7070 CLOSE #FILE:XIO 36,#FILE,ZERO,ZER
O,FILE$:XIO 33,#FILE,ZERO,ZERO,FILE$
7080 SRFLAG=C:ADDR=BUFF
7090 TRAP 40000:GOTO MENU
8000 SRFLAG=ZERO:? :? "*** SEND FILESP
EC ";:INPUT L$:IF L$="" THEN 8090
8005 TRAP 8000:IF L$(2,2)<>":" THEN IF
 L$(3,3)<>":" THEN ? "SPECIFY DEVICE!"
:GOTO 8000
8010 A=ZERO:IF L$(1,2)="C:" THEN A=128
8014 SRFLAG=C:? "*** LOADING INTO BUFF
ER ***":OBJ=0
8015 ADDR=BUFF:TRAP 8080:FILE$=L$:OPEN
 #FILE,4,A,FILE$
8020 IF TRN THEN 8050
8030 GET #FILE,A:POKE ADDR,A:ADDR=ADDR
+1:IF A>ZERO AND A<255 THEN OBJ=1
8050 POKE 1536,OBJ
8060 C=USR(1537,ADDR):BYTES=C-BUFF:BYT
E=((BYTES/128)-INT(BYTES/128))*128
8065 IF PEEK(195)<>136 THEN ? "*** ERR
OR ";PEEK(195):GOTO 8085
8070 FOR A=C TO C+127-BYTE:POKE A,BYTE
:NEXT A:C=A:BYTES=C-BUFF:GOTO 8090
8080 ? CHR$(253);"*** FILE NOT FOUND *
**"
8085 SRFLAG=ZERO:L$=""
8090 TRAP 40000:GOTO MENU
9000 TRM=32-TRM
9010 GOSUB IO:GOTO MENU
9900 BAUD=BAUD+1:IF BAUD>10 THEN BAUD=
8
```

continued on next page

```
9910 IF BAUD<10 THEN ? 300*(BAUD-7);
9920 IF BAUD=10 THEN ? 1200;
9930 ? " BAUD":GOTO MENU
10000 C=FRE(0)-400:DIM BUFF$(C),IO$(17
0):BUFF=ADR(BUFF$):ADDR=BUFF
10005 ZERO=0:WON=1:SOH=1:EOT=4:ACK=6
10010 BEL=7:BS=8:LF=10:VT=11:CR=13
10020 NAK=21:CAN=24:EOF=26:EOL=ZERO
10030 KEY=1:FILE=2:PTR=3:MODEM=4
10040 DIM C$(1),FILE$(15),L$(130)
10050 MENU=1000:TERM=1050:PLX=0
10060 ERRTRY=10:CON=53279:IO=14000
10070 OPEN #KEY,4,ZERO,"K:"
10080 BAUD=8:GRAPHICS ZERO:?
10120 XIO 34,#MODEM,192,ZERO,"R1:"
10130 XIO 36,#MODEM,BAUD,ZERO,"R1:"
10180 BUFF$(1)=" ":BUFF$(C)=" "
10190 BUFF$(2,LEN(BUFF$))=BUFF$
11000 ? "          ATARI MODEM VER. 4.2"
11010 ? " COPYRIGHT(C) 1982 JIM STEINB
RECHER"
11020 ? "           37220 TRICIA DRIVE"
11030 ? "         STERLING HTS MI. 48077
"
11040 ? :? "  BUFFER= ";C;" BYTES, ";I
NT(C/128);" SECTORS":?
11050 ? "  WITH  WARD CHRISTENSEN'S  X
MODEM"
11060 ? "         FILE TRANSFER PROTOCOL
"
11070 ? "  FOR USE ON  ASCII CP/M SYS
TEMS"
11080 ? :? "      ATARI TO ATARI FILE TR
ANSFER"
11090 ? "       AND SELECTED ATARI SYSTE
MS"
12000 FOR C=1536 TO 1736:READ A:POKE C
,A:NEXT C
12010 FOR C=1 TO 152:READ A:IO$(C)=CHR
$(A):NEXT C
12020 POKE 704,MSAVE:POKE 705,PLX
12030 GOTO MENU
13000 TRAP 13000:TRAN=TRN
14000 CLOSE #MODEM:CLOSE #PTR:CLOSE #F
ILE
14005 XIO 36,#MODEM,BAUD,ZERO,"R1:"
14010 XIO 38,#MODEM,TRAN,ZERO,"R1:"
14020 OPEN #MODEM,13,ZERO,"R1:"
14030 XIO 40,#MODEM,ZERO,ZERO,"R1:"
14040 POKE 712,TRN*4.1:POKE 707,0:POKE
 766,ZERO
14050 TRAP 40000:RETURN
15000 DATA 1,104,104,133,213,104,133,2
12,162,32,169,7,157,66,3,169,0,157,72,
3
15010 DATA 157,73,3,32,86,228,48,40,16
0,0,145,212,173,0,6,201,1,208
15020 DATA 20,177,212,201,155,208,14,1
69,13,145,212,230,212,208,2,230,213,16
9,10,145
15030 DATA 212,230,212,208,2,230,213,2
4,144,196,132,195,96,74,68,83
15040 DATA 104,104,133,204,104,133,203
,104,133,206,104,133,205,162,32,169,11
,157,66,3
15050 DATA 169,0,157,72,3,157,73,3,160
,0,173,0,6,201,1,208,26,177,203,201
15060 DATA 13,208,20,160,1,177,203,201
,10,208,12,160,0,230,203,208,2,230,204
,169
15070 DATA 155,145,203,160,0,177,203,3
2,86,228,230,203,208,2,230,204,165,203
,197,205
15080 DATA 208,187,165,204,197,206,208
,181,96
15090 DATA 169,13,157,66,3,76,86,228,1
69,7,32,189,6,76,86,228
15100 DATA 168,169,11,32,189,6,152,76,
86,228,157,66,3,169,0,157,72,3,157,73,
3,96
16000 DATA 104,104,133,213,104,133,212
,104,133,215,104,133,214
16010 DATA 162,64,32,163,6,173,235,2,2
01,0,240,68,162,64,32,171,6
16020 DATA 172,200,2,192,0,208,16,201,
7,208,2,169,253,201,8,208,2,169,126
16030 DATA 201,32,144,20,172,192,2,240
,10,162,0,129,212,230,212,208,2,230,21
3,162,0,32,179,6
16040 DATA 165,215,197,213,208,190,165
,214,197,212,208,184,169,8,141,194,2,9
6
16060 DATA 240,176,173,252,2,201,255,2
40,41,162,16,32,171,6,172,193,2,192
16070 DATA 0,240,5,162,0,32,179,6,172,
200,2,192,0,208,12,201,253,208,2
16080 DATA 169,7,201,126,208,2,169,8,1
62,64,32,179,6,173,31,208,201,7
16090 DATA 16,199,141,194,2,96
```

TYPO TABLE

Variable checksum = 2080186

Line num range	Code	Length
10 – 1046	KP	378
1050 – 1500	LQ	397
1510 – 1790	HW	363
2000 – 2370	OW	438
2380 – 2830	CZ	317
2840 – 3320	EX	357
3330 – 3810	NR	314
3820 – 4065	OE	252
4070 – 5010	EQ	405
5020 – 6030	XH	341
6035 – 7040	BC	437
7050 – 8030	ES	524
8050 – 9920	BS	404
9930 – 10120	CJ	491
10130 – 11080	TH	455
11090 – 14040	VS	345
14050 – 15060	JC	514
15070 – 16030	YA	522
16040 – 16090	FN	294

ONLINE SERVICES

The best in online database services for the Atari

by ROBERT DEWITT
Managing Editor

THE POWER OF COMPUTERS TO manipulate data at lightning speed has given rise to a burgeoning new industry — online database services. You can hook up your trusty Atari to one of these services, and have it search out and capture in minutes information that might have taken you weeks of traditional digging. As more and more individuals take up computing, such information services are proliferating. **Antic** has reported on a few of these services in the past (June 1982 and May 1983). Here we summarize the main features of those more established services, along with several new services that have recently been made available.

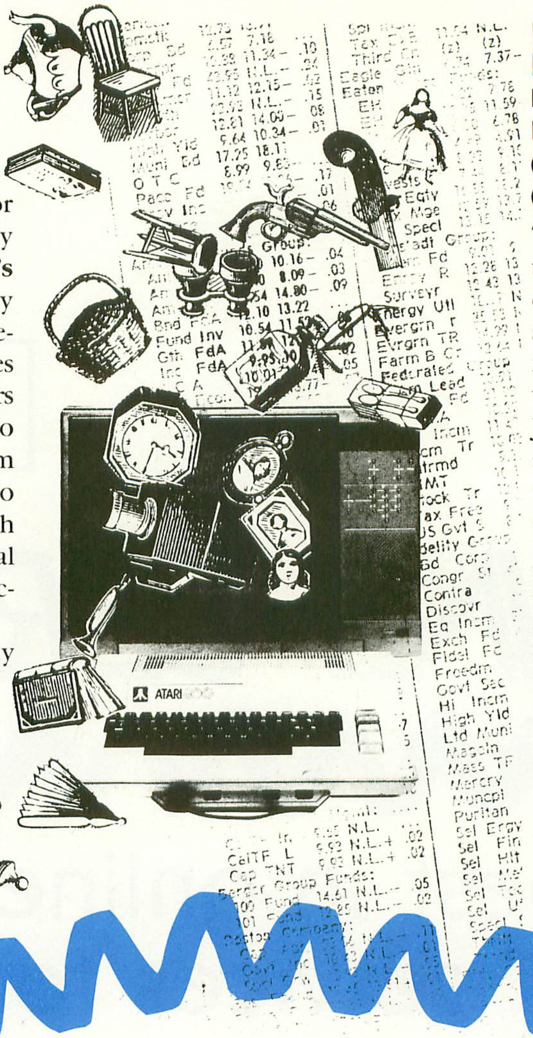
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Collector's Data Service

420 W. Mercer
Seattle, WA 98119
(206) 281-7273
(800) 435-0100

A variety of rare and valuable items for sale, including everything from jewelry to real estate, is listed by **Collector's Data Service**. It costs about a penny per line per day to place an advertisement on the service, and access charges are $17 per hour during business hours and $8.50 per hour at other times. No membership fee or monthly minimum charge is required; charges are billed to your major credit card account, which is verified online. Access through local Tymnet numbers is included in the access fee.

Of Special Interest: stolen property notices.





Dow Jones/ News Retrieval Service

P.O. Box 300
Princeton, NJ 08540
(609) 452-1511
(800) 257-5114

The grandaddy of all online services, this started as a stock quotation service during trading hours, and your need for such information cannot be better satisfied, even though a number of other services now include stock quotes. Dow Jones (DJ) owns the *Wall Street Journal* and *Barron's*, and offers them electronically here (on an exclusive basis), along with fast-breaking financial news gathered by the DJ News Service. Profiles of 10,000 companies also are on file. If you need financial data, you need Dow Jones, despite the service's moderately expensive rates ($72/hour during the day, $12/hour at night) and frequent surcharges for special information.

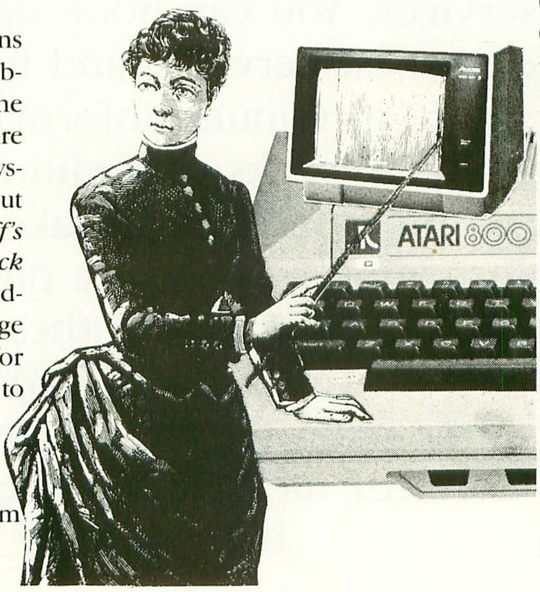
Special Feature: text search to 1979.

NewsNet

945 Haverford Rd.
Bryn Mawr, PA 19010
(215) 527-8030
(800) 345-1301

A true child of the communications boom, **NewsNet** is an electronic publisher that carries 175 newsletters, the UPI press wire, and the P.R. newswire (a roundup of press releases). The newsletters are heavily business oriented, but some titles, such as *Howard Ruff's Financial Report* and the *Penny Stock Preview*, should appeal to the individual investor. The evening access charge at 300 baud is $18 per hour ($36 for 1200-baud transmission). If you want to read text (as opposed to simply searching for topics), you pay a surcharge that varies by the title of the document. The service's minimum monthly charge is $15.

Strong Point: financial advice.

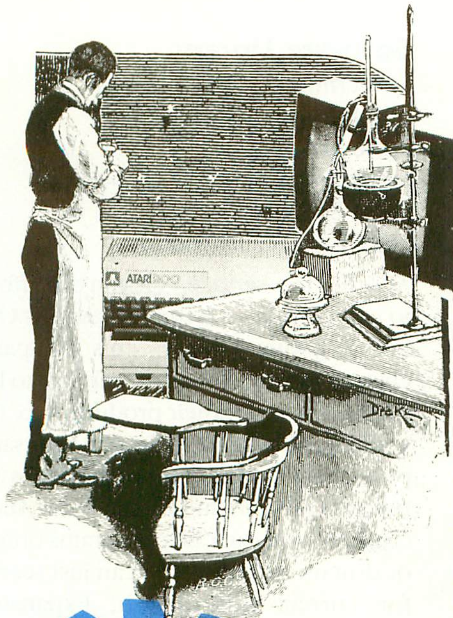


PLATO

Control Data Publishing Co.
P.O. Box 261127
San Diego, CA 92126
(800) 233-3784
(800) 233-3785 (in California)

Years ago, CDC and the University of Illinois collaborated to develop a computerized system to present and manage educational material. The result is **PLATO**, a network of mainframe and microcomputers that contains over 200,000 hours of structured "lessons" on every topic imaginable. Until recently, PLATO was restricted for technical reasons to expensive terminals that were specially designed for it, but an innovative $50 cartridge from Atari now makes PLATO available to you at only $5 per evening hour. See David and Sandy Small's article on PLATO in this issue for further details.

Strong Point: online learning.



BRS After Dark

1200 Route 7
Latham, NY 12110
(518) 783-1161
(800) 833-4707

Though it sounds slightly naughty, the name of this service actually betrays a common aspect of many online databases aimed at individuals — they cost less after working hours. BRS stands for Bibliographic Retrieval Service. Originally (and still) a medical/technical service during the day, it offers a wealth of scientific information. **BRS After Dark** is an abbreviated version of BRS that offers data on a number of scientific and technical fields. You pay $50 up front plus fees of between $6 and $15 per hour, depending on which of the service's 25 databases you use. The minimum charge is $12 a month.

Strong Point: scientific research.

Delphi

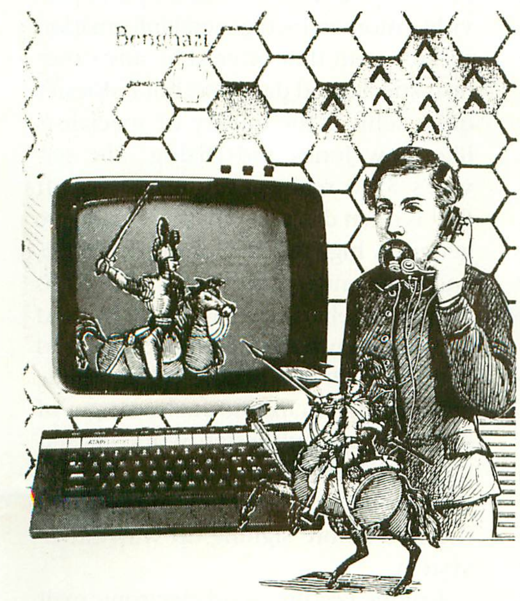
3 Blackstone Street
Cambridge, MA 02139
(617) 491-3393
(800) 544-4005

Delphi, a new service from General VideoText Corp., may presage a major movement of the future — user publishing. It offers news, electronic mail, and searchable data, but it also specializes in user-created files, which may be either private or public. You can write, edit and store files while connected to the system, or upload material created offline. You can keep your calendar up to date, contribute to collaborative novels, publish a newsletter, register your opinions, seek expert advice, or confer in real time with other users. Registration is $50, but non-prime-time access is only $6 per hour, even at 1200 baud, and there is no monthly minimum.

Of Special Interest: Atari bulletin board.

CompuServe

5000 Arlington Center
Box 20212
Columbus, OH 43220
(614) 457-8600
(800) 848-8199



CompuServe dominates the field of online services for individuals, and more than 100,000 subscribers have access to its potpourri of information. Inexpensive to join and use, CompuServe offers a wide variety of services (including programming, storage, bulletin board, shopping, electronic mail, airline reservations, and real-time communication) as well as information. Its main news source is the Associated Press. CompuServe's information base is vast, if sometimes trivial. Before signing up, compare it to its major competitor, The Source. Details are available at most computer stores. Night rates are $6 per hour plus occasional surcharges. The $40 entry fee is often defrayed or waived as the result of various promotional schemes.

Of Special Interest: strong Atari group.

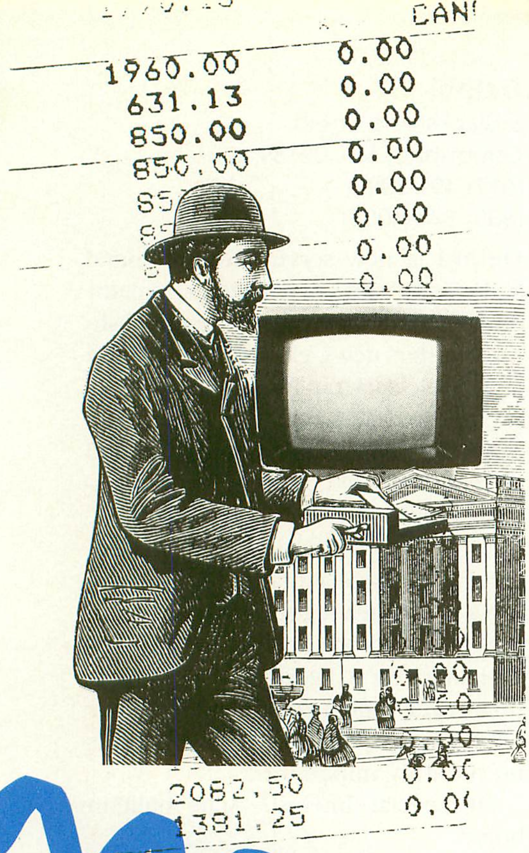
DIALOG Knowledge Index

3460 Hillview Ave.
Palo Alto, CA 94304
(415) 858-3785
(800) 227-1927

Space research gave rise to **Dialog**, a subsidiary of Lockheed. During working hours, its 200 databases (which contain over 75 million records) serve more than half a million users at prices we needn't describe. At night, 22 of the service's most popular databases are available through a service called **Knowledge Index**, which specializes in medicine, psychology, and business. This service costs $24/hour. There is no minimum charge, but you must buy a $35 instruction manual (consider it a fee for the two free hours you're given to learn the system). Hardcopy printouts of desired material are reasonably priced.

Of Special Interest: Microcomputer Index.

continued on next page



CLEO
2164 W. 190 St.
Torrance, CA 90504
(213) 618-0200

A freebie for callers who live in the areas it serves (long-distance for others), **CLEO** is a Computerized Listing of Employment Opportunities. Its scope is currently limited to high-tech jobs in California, but is growing rapidly. Watch for CLEO's arrival in your community. Local numbers now active are (213) 618-8800 (Los Angeles), (714) 476-8800 (Orange County), (619) 224-8800 (San Diego), (408) 294-2000 (San Jose), and (415) 482-1550 (San Francisco).



Pronto
Chemical Bank of New York
P.O. Box 20302
Jericho, NY 11753
(800) 782-1100

Pronto is making the dream of banking from home a reality. This electronic service allows you to track your account balance, pay bills and budget your financial resources online, and gives you access to other "electronic customers" and the bank's staff. You can establish and maintain any type of account on the system. Pronto sends you written, monthly statements of activity and budget status. Chemical Bank has opened the entire state of New York to Pronto, and licenses the system to a number of other banks around the country. Among these are Union Trust in Connecticut; Manufacturer's National Bank, Detroit; First National of Pennsylvania; American Security, Washington, D.C.; Banker's Trust, South Carolina; Florida National Bank, Jacksonville; Worthen Bank, Little Rock, Arkansas; and Crocker Bank, San Francisco.

Of Special Interest: cartridge-based for the Atari.

Computer Phone Book
by Mike Cane
New American Library
1633 Broadway
New York, NY 10019
and
Omni Online Database Directory
by Edelhart and Davies
MacMillan Publishing Co.
866 Third Avenue
New York, NY 10022

These two books are recent and comprehensive guides to hundreds of online services for computer owners, and each contains an enormous amount of information. **The Phone Book** ($12.50) is better organized and easier to handle. **The Omni Directory** ($10.95) is organized by topic, but the authors' method of subdividing their subject matter may not coincide with your special needs. We use both books at **Antic**, and suggest that you look at each of them before you choose one over the other.

Software Library
Searchmart Corp.
745 U.S. Highway 1
Suite 101
North Palm Beach, FL 33408
(305) 845-2996 (info)
(305) 84L-OGON (data)

Another free service — if you can afford to call Florida — is the Free Access Online Software Library. This company charges manufacturers of software to list the particulars of their products here for your possible interest. Several thousand programs for all manner of machines are now detailed, including many for Atari. Caution: you can't buy programs online or download them; you can just search for current information. Expansion plans call for a hardware database and other product information, plus LOGON numbers in Canada and on the West Coast.

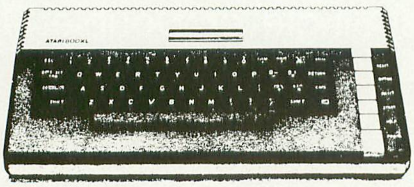
The Source
1616 Anderson Road
McLean, VA 22102
(703) 734-7540
(800) 336-3330

The higher-priced spread of the margarine group, **The Source** attempts to provide a more refined general information service than that offered by any other non-specialized database, but it doesn't quite achieve the quality of specialists like Dow Jones and Dialog. The service's $100 registration charge is stiff (but is often discounted), access rates are generally high ($7.75/hour for evenings and weekends), and there's also a $10 minimum charge per month. We find it easier to use than CompuServe, and features such as a private "chat" mode and a conferencing mode show signs of some thoughtful design work. Its services and information are similar to CompuServe's, but you should compare the two before signing up with either system.

Unique Feature: send electronic mail by voice.

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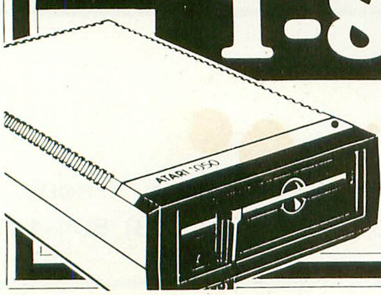
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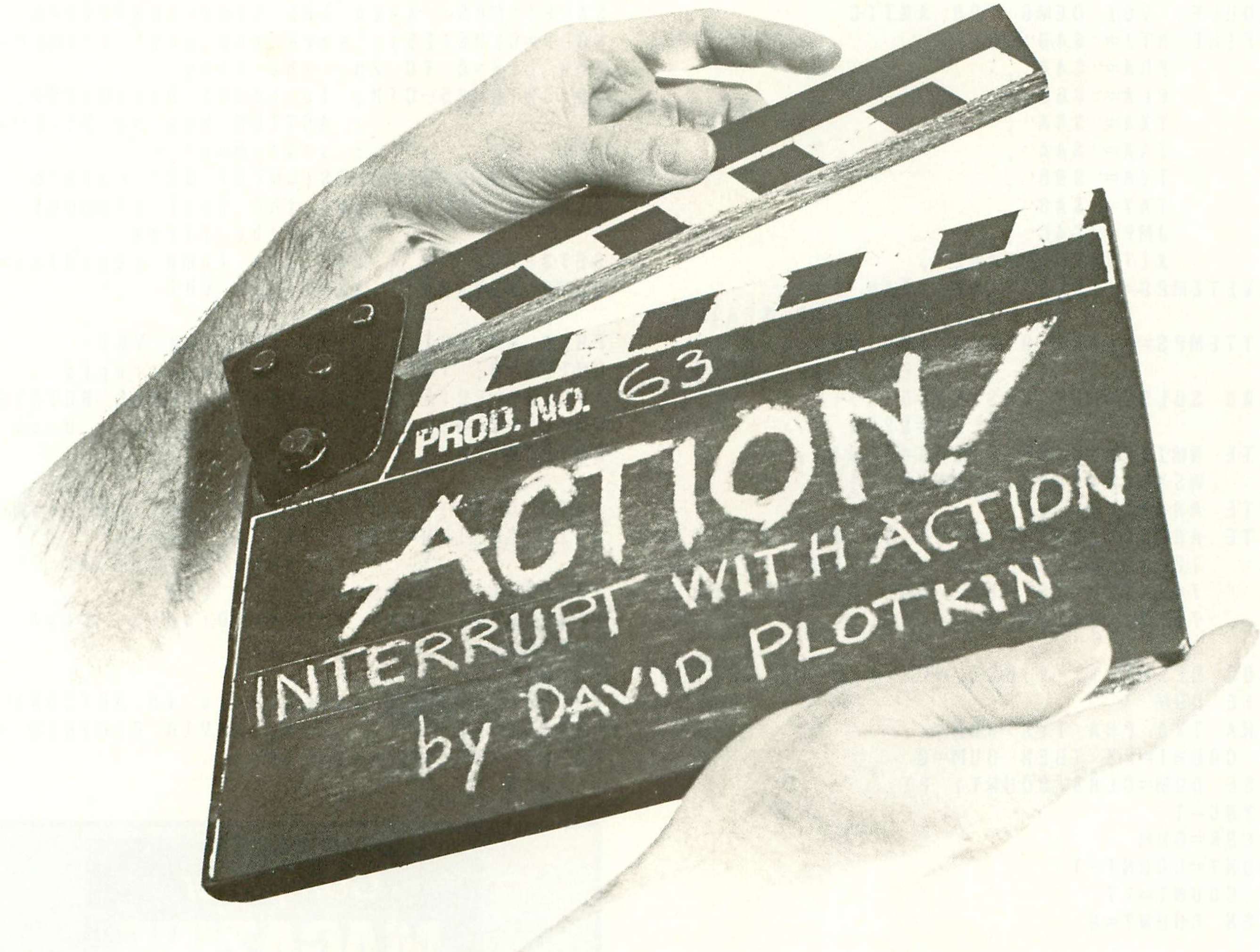
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LINDA TAPSCOTT



An "interrupt" takes place in a computer system whenever one process takes precedence over a process that is being executed. It interrupts the lower-priority process so that it (the interrupt) can be executed first. Several interrupts are available on the Atari computers, including the display-list interrupt (DLI), the vertical-blank interrupt (VBI), and the system-timer interrupt, which was discussed in the January issue (**Antic**, "Page Flipping," p. 94).

Before **ACTION!** came along, you had to be able to program in machine language to use these interrupts. Clinton Parker, ACTION!'s author, may have envisioned that ACTION! programmers would continue to use machine code to write interrupt routines, installing blocks of machine-language codes generated by their assemblers into their ACTION! programs. But ACTION! is so fast that you can actually write a VBI or a system-timer interrupt in this high-level language, which is much easier than writing it in machine language.

SYNOPSIS

This article discusses advanced programming techniques using the ACTION! language. To use the accompanying listings, you must have the ACTION! cartridge from Optimized Systems Software.

Unfortunately, when an ACTION! VBI interrupts an ACTION! program, the two use the same space in memory to hold temporary math variables for calculation. Because of this, the interrupt routine can alter the variables from the interrupted routine. As a result, results can be quite unpredictable.

Mike Fitch of Optimized Systems Software (OSS), ACTION!'s publisher, has solved this dilemma with two short machine-language routines that save the contents of the temporary math registers to the stack at the beginning of the interrupt, and then restore them just before the interrupt ends. Mike calls these routines SAVETEMPS and GETTEMPS.

You use the DEFINE command to assign machine-language code blocks to SAVETEMPS and GETTEMPS. The accompanying ACTION! program demonstrates the use of GETTEMPS and SAVETEMPS in a VBI. It also produces an interesting effect on the screen. These routines are just what you need if you want to use interrupts written in ACTION!

David Plotkin is a chemical engineer with Standard Oil Company of California and an avid game programmer.

continued on next page

```
MODULE; VBI DEMO FOR ANTIC
DEFINE RTI="$40",
       PHA="$48",
       PLA="$68",
       TXA="$8A",
       TAX="$AA",
       TYA="$98",
       TAY="$A8",
       JMP="$4C",
       XITVBV="$E462",
SAVETEMPS="[$A2 7 $B5 $A8 $48
                  $CA $10 $FA]",
GETTEMPS="[$A2 0 $68 $95 $A8 $E8
                  $E0 8 $D0 $F8]"
CARD SDLST=560,VDSLST=512,
          VVBLKD=$224
BYTE NMIEN=$D40E,COLBK=$D01A,
     WSYNC=$D40A,COUNT=[0]
BYTE ARRAY DLIST
BYTE ARRAY CLRS(0)=[64 66 68 70 72 74
     72 70 68 66  64  66  68  70  72
     74  72  70  68  66  64  66  68
     70 72 74 76 ]

PROC DLINT(); a DLI written in ACTION!
BYTE DUM
[PHA TXA PHA TYA PHA]
IF COUNT=26 THEN DUM=0
ELSE DUM=CLRS(COUNT) FI
WSYNC=1
COLBK=DUM
COUNT=COUNT+1
IF COUNT=27
THEN COUNT=0
FI
[PLA TAY PLA TAX PLA RTI]

PROC INIT7()
GRAPHICS(7)
SETCOLOR(0,2,10) SETCOLOR(1,5,12)
SETCOLOR(2,0,0)
RETURN

PROC DLSETUP(); custom Display List
BYTE I
INIT7()
NMIEN=$40
DLIST=SDLST
VDSLST=DLINT
FOR I=30 TO 40
DO DLIST(I)=141 OD
FOR I=42 TO 54 STEP 2
DO DLIST(I)=141 OD
FOR I=57 TO 72 STEP 3
DO DLIST(I)=141 OD
FOR I=76 TO 84 STEP 4
DO DLIST(I)=141 OD
NMIEN=$C0
RETURN

PROC ROTATE(); the VBI routine
BYTE HOLD,CTR,CNTR
SAVETEMPS; save the temp registers
HOLD=CLRS(26); save the last element
FOR CTR=0 TO 25; the loop
DO CNTR=25-CTR; to count backwards,
             ; ACTION has no STEP-1
             ; statement
CLRS(CNTR+1)=CLRS(CNTR) OD; rotate
CLRS(0)=HOLD; put the last element
            ; into the first
GETTEMPS    ; get the temp registers
[JMP XITVBV]; exit the VBI

PROC VBINST(); install the VBI
NMIEN=0; turn off the interrupts
VVBLKD=ROTATE; vector to PROC ROTATE
NMIEN=$40; turn the interrupts back on
RETURN

PROC DJD(); the driver routine, named
BYTE CRSINH=752; for a famous
               ; computer genius
VBINST() ; install the VBI
DLSETUP(); set up the Display List
CRSINH=1
PRINTE()
PRINTE("Antic Interrupts in ACTION!")
PRINT("          by DAVID PLOTKIN")
DO OD; an endless loop...
RETURN
```

A VIRTUAL MIRACLE

An advance look at the fourth generation modem

by BILL LEE

The modem may be the Rodney Dangerfield of computer gear — it gets no respect. Maybe it's the funny earmuffs (on acoustical models) or the jargony, newspeak name, but people seem to disdain the modem, or at least to take it for granted.

They shouldn't, though. The modem is as significant, and will soon be as ubiquitous, as the telephone. The reason? The modem is the device that links you via phone lines to the rapidly expanding universe of computer-based information.

And a new kind of modem is now stepping into the spotlight. Called a "virtual" modem, it can mimic any of the capabilities of its more straightjacketed predecessors, and it's smart, too — smart enough to rebuff even the most ingenious hacker. It's a true "fourth generation" modem.

The first generation modem was a simple, acoustic unit that converted digital electronic signals into audible, analog tones and *vice versa*. The two ends of a telephone's receiver fit into two indentations on the acoustic modem that look like earmuffs. Next came the direct-connect modem that plugs into your computer — no earmuffs on this device! Then the third generation modem was introduced, along with onboard programmable features such as autodial, autoanswer, number storage and variable speed.

The problem with all of these modems is that their manufacturers were unable to agree upon a standard for the industry. An international standard has been established by the Brussels, Belgium,-based CITTT (an international organization made up of official representatives from governments around the world who have experience in the fields of telecommunications and banking), but influential U.S. companies such as IBM and AT&T have ignored this standard in bids to force the industry to move in their directions. There have been no clear winners in this struggle, but as a result of it there currently are a lot of different kinds of modems on the market.

Enter our hero, the fourth generation, or virtual, modem. This device automatically configures itself to match the modem it is communicating with, no matter what speed, feature or protocol is being used.

A protocol is the means by which one modem talks to another. In human terms, a conversation in French requires that the French protocol of meaningful sounds be used, and that these sounds be arranged in a specific syntax. If I talk to you in French and you understand only English, we need a French/English interpreter. The modem performs a similar function for computers, but to do so fully it requires memory and processing capabilities of its own.

The virtual modem has these capabilities. Controlled by a microprocessor, it "knows" when your data number is called, and answers automatically. It "asks" who is calling, both in terms of the equipment being used at the other end and of the person or organization making the call. It automatically configures itself to match the requirements of the other equipment, and requires that the other party pass a security test of great sophistication before it allows access to your computer. It captures messages in its own buffer, and either prints them directly or saves them onto media.

MicroTelecom of San Rafael, California, is one of the first manufacturers planning to introduce a virtual modem. Their prototype model is able to shift among speeds from 300 to 2400 baud, recognize all extant modem types and protocols (including 103, 212, x.21, x.25, SNA and IBM-3274), and operate in either full or half duplex, and synchronous or asynchronous modes, while providing both autodial and autoanswer capabilities.

Other brands and future models will undoubtedly expand upon the features of this early version of the fourth generation modem, but one thing is certain — these new modems will rapidly earn our respect.

One of the designers of MicroTelecom's virtual modem prototype, Bill Lee currently works as a designer for Marsten Systems Corp. of Los Altos, California. Marsten is scheduled to distribute MicroTelecom's fourth generation modem to the consumer market when the device is introduced.

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PLATO RISING

Online learning for Atarians

by DAVID & SANDY SMALL

Atari's PLATO cartridge (officially known as the Atari Access Software for the PLATO Services Network) is the Atari user's link to Control Data Corporation's PLATO network, the "ultimate" electronic information and communication utility.

PLATO was developed in 1962 at the University of Illinois. After 14 years of development, Control Data (CDC) bought the marketing and trademark rights to the PLATO software.

In the early 1970's, a number of large corporations began to develop specialized vocational software for use on CDC's mainframe computers. This software was used to tutor employees, who accessed the material through expensive remote graphics terminals. There was a $50/hour surcharge for use of CDC's computers, so only enormous organizations such as Boeing, Lockheed and major universities could afford to use them.

Then, during the mid-1970's, CDC began to sell Cyber supercomputers running the PLATO operating system to corporations and universities all over the world. Electronic mail, interactive games, bulletin boards, and many other services associated with electronic utilities evolved on PLATO during this period.

By 1978, the PLATO terminal evolved into a high-resolution, touch-sensitive screen with a dedicated keyboard, graphics printer and 1200-baud modem. As personal computers became more capable, CDC developed terminal "emulators" that gave some PC's, such as the Zenith Z-100 and the IBM PC, the ability to connect to the PLATO system. This eventually led to the Homelink "after-hours" service, which was affordably priced at $5 per hour. As a result, a whole new generation of users discovered PLATO.

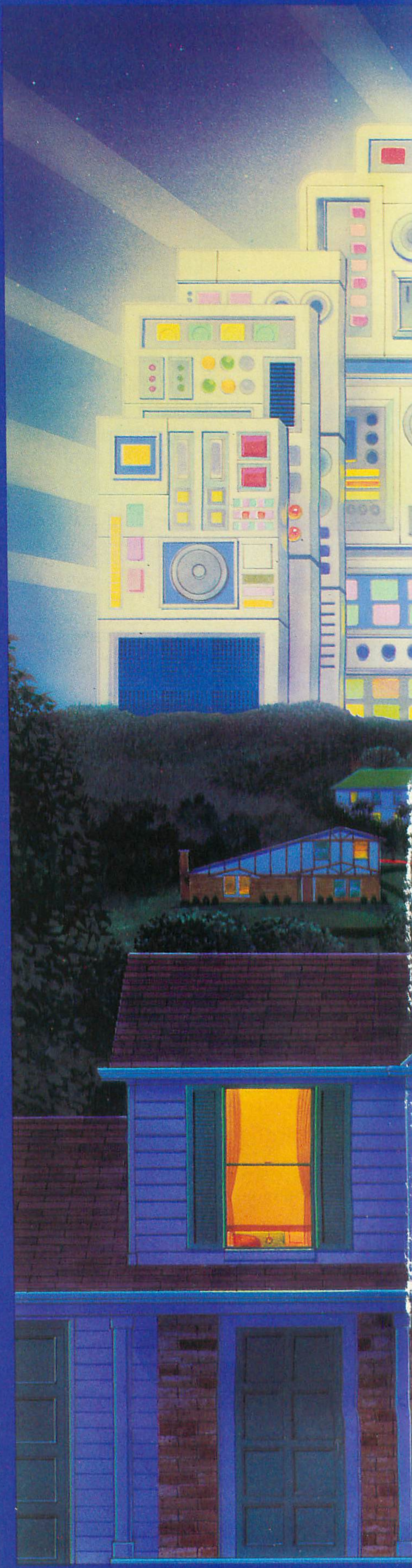
According to officials at Atari Inc., Atari's access software for the PLATO Homelink service should be released by the third quarter of this year. For stylistic reasons, we'll refer to this product as the Atari PLATO cartridge, although this is not its official name. —ANTIC ED

If you're an Atari computer user, you should be using PLATO.

Does this statement strike you as being too broad, too dogmatic? Well, it isn't — it's simply the truth. With its vast variety of applications and uses, PLATO has something important to offer every Atari user.

Are you interested in educational software? More than 200,000 user hours worth of courseware — the largest educational-software base in existence — is available on this extraordinary system. This software is much more sophisticated than conventional text-only software — in fact, its combination of

continued on page 38




AHS

high-resolution graphics, informative text and user-friendly help features make it the best instructional system currently available. All in all, we have no hesitation in calling PLATO one of the finest communications systems ever devised.

PLATO began as an instructional computing system on an enormous Control Data Corporation (CDC) mainframe computer more than 15 years ago. Since then, PLATO has evolved into a remarkable communications system that links thousands of users across the North American continent and around the world. As a result, an international community — a world community, the first of its kind — has developed.

Thousands of people use PLATO every day to send mail ("Personal Notes") to each other, to communicate via bulletin boards or to do coursework. An entire PLATO-based society has sprung up. Marshall McLuhan's "global village" has become a reality.

PLATO's central system is located in Minneapolis, Minnesota, the home of CDC. Telephone and satellite links connect it to systems at the University of Delaware, Florida State University, and the University of Illinois, as well as to major systems in Australia and Belgium.

THE ATARI PLATO CARTRIDGE

Until recently, however, access to PLATO was restricted to those who could afford the cost of a dedicated PLATO terminal — $1000 per month — or people who used it at work or school. After using PLATO in college on an experimental basis, it was difficult for us to give it up. Interaction with other users, "notesfiles" that provide a medium for stimulating discussions and arguments every day, battles in the depths of ancient dungeons or in the far reaches of outer space — all of these were lost to us. So imagine our excitement when we heard that Atari would soon be offering a cartridge that could access PLATO!

The **Atari PLATO** cartridge allows Atari computers to emulate a standard PLATO terminal, receive and send text, display graphics, and use PLATO's special keyboard commands. Some limitations are involved if you use this kind of hookup, as compared to using an actual PLATO terminal, but they're insignificant when you consider the low cost of an Atari computer and the awesome power of the PLATO system.

GRAPHICS

One of Atari PLATO's limitations involves its graphics-display capabilities. It uses a display made up of a 512×512 grid of black-and-white dots; these are used to form both letters and graphics characters. This display is similar to the Atari's highest resolution mode, Graphics 8 (or ANTIC mode F) — which has a resolution of 320×192 — but has been "squeezed" to fit into the Atari screen. This works quite well, except when very detailed graphics are involved. And it's even possible to view a portion of the 512×512 screen at full resolution (thanks to the efforts of Atari designer Vincent Wu) when this is necessary for detailed work.

GENERATING SPECIAL COMMANDS

To duplicate the standard PLATO keyboard, the Atari computer must generate a number of special keystrokes. These are used to control your progress through a program, or, in PLATO terminology, a "lesson." Examples include "DATA," "LAB," "NEXT," and "HELP." To generate these commands, simply press the [START] button and the first letter of the key's name. For example, to "press" the DATA key, hold down [START] and press "d." Within fifteen minutes or so, you should be familiar and comfortable with these commands and the special requirements of the Atari PLATO cartridge.

USING THE CARTRIDGE

To use Atari PLATO, you need the Atari PLATO cartridge, an Atari 850 interface and a modem, which can be either a 300-baud or a 1200-baud model. The modem need not be the model manufactured by Atari, but a 1200-baud unit is strongly recommended. These are four times faster than their 300-baud brothers, and this makes a big difference on PLATO. A tremendous amount of information on the system is available, and the faster you can get it, the better.

The interface and modem are used to dial PLATO's local number in your community. One of PLATO's major advantages is that you can access it by means of a local telephone call — you don't have to worry about calling Minneapolis long-distance.

CONNECTING WITH PLATO

When you first dial up PLATO with your new cartridge, there are a number of initial steps you must go through. At first they'll be confusing, but with a little practice you'll breeze through the procedure. As with every other aspect of PLATO, the log-in procedure has been tested by tens of thousands of users and has been made as simple and straightforward as possible.

Essentially, CDC provides you with a local dialup number (for 300- or 1200-baud operation) and a "signon" code that consists of your "name" and "group." These are abbreviated as follows: "name / group." Get used to this syntax; you'll be known by your "name / group" no matter what you do on PLATO.

You will also be given a system name; a full signon consists of the following elements: "name / group / system." Since you can get mail from people on other systems, or communicate with them by means of "Notesfiles," you'll soon run across the names of some of the systems other than your own.

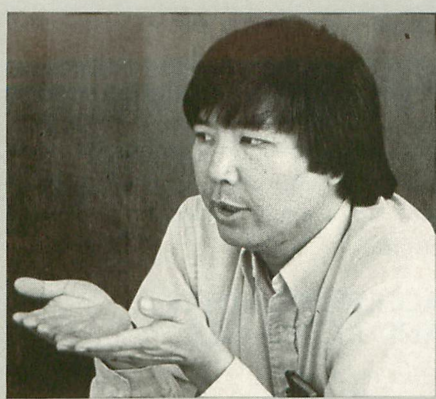
Local log-in procedures vary to a certain extent; consult your PLATO cartridge and Control Data Homelink manuals for details.

TERM-TALK

Between ten and 600 people are likely to be logged onto PLATO at any given time, and many of them will show up on the user's list — the others are engaged in work that can't be interrupted. Press "user list" and you'll see the name/group of each logged-in user.

You can talk to any PLATO user directly via "TERM-talk." TERM is a special PLATO key. To initiate this means of communication, press START-t. When the message "what term?" appears at the bottom of the screen, type "talk" and press [RETURN]. You will then be asked for the name and group of the person you want to talk to. Once you've provided this information, PLATO will "ring" the other person.

VINCENT WU,
Designer of Atari's PLATO Cartridge


LINDA TAPSCOTT

Vincent Wu, designer of Atari's "Access Software for the PLATO Services Network," has accomplished something many said couldn't be done — he's made the powerful PLATO educational service run on Atari computers.

Born in China in 1942, Vince emigrated to the U.S. at age nine, and lived in New York and San Francisco before acquiring an A.B. in physics from San Jose State University in 1964. He earned a Master's Degree in Mathematics in 1966 at the University of Illinois, Urbana, where he then worked with Paul Tenczar, the originator of the PLATO system language called TUTOR, at the Computer Educational Research Laboratory (CERL).

At the U of I Medical Computer Lab, Vince was involved in the development in 1976 of the first minicomputer base for the PLATO educational operating system.

The PLATO project at Atari was started in 1981 by Lane Winner. He wrote a working PLATO emulator (Version 1) that was strictly 300 baud, and displayed only one segment of the PLATO screen at any given time. Vince then worked with Joe Miller on Version 2 of the terminal-emulator program, which was presented to Control Data Corporation (CDC) in December of 1981. According to Wu, this was the first time a microcomputer was used to access the CDC PLATO system.

By early 1983, however, negotiations between CDC and Atari had broken down, and the PLATO emulator project at Atari was — temporarily, it turned out — dead. Due to Vince's concerted efforts, which included many hours of work on his own time, Atari's top management decided to give the project another chance. As a result, Vince was the sole designer of Version 3 of Atari's PLATO access software, and was instrumental in initiating the negotiations that brought CDC and Atari back together on the project.

Vince was the first designer to write an algorithm that could compress the 512×512 line PLATO screen into the 320×192 lines found in Atari home computers (Graphics Mode 8). Because this compression resulted in the loss of some fine detail, he added a zoom feature that magnifies chosen areas of the display. He also emulated PLATO's touch screen with a joystick-controlled cursor. Because of these and other features, an Atari with Vince's cartridge installed can run four times as much of PLATO's courseware as the IBM PC.

Vince's cartridge for PLATO is the only Atari product that displays 64 columns by 32 lines of text on a normal TV screen. It also allows the user to adjust the color and brightness of both image and background. In addition, it can be used with a wider variety of modems than any other Atari product.

TERM-talk gives you the opportunity to learn about the PLATO system from other users, who are usually happy to share suggestions about lessons and notesfiles. In addition, special consultants are available to answer questions or solve problems concerning the system; just type "TERM-consult" and a consultant will be on-line in a few moments. Don't be afraid to call a consultant — they're there to help. We've been helped by "Chip" Aspnes, Barry Doolittle, Chuck Miller, Scott Rautmann, and Chris Johnson, among others. You'll be glad you got to know them.

LEARNING BY WATCHING

PLATO also offers a special monitor mode that lets you learn by watching others learn. It allows you to "monitor" the progress of another user (with his or her permission, of course!). You see the same things on your screen that the other user sees, and the two of you can communicate with each other during the monitoring process. Some of PLATO's complex games, such as Moria or Empire, are best learned through use of the monitor mode.

NOTESFILES

Notesfiles are a much improved version of computer bulletin boards such as those available on **CompuServe** or **The Source**, or on public-domain bulletin board systems (BBS's). Such boards usually allow users to talk to each other about a particular subject. PLATO's notesfiles, however, have an added advantage: ten years of use, and the useful feedback provided by numerous users over that period of time.

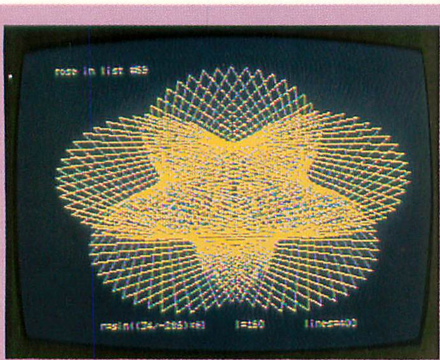
Let's look at a sample notesfile — in this case, one that is devoted to discussion of Atari computers. To access it, select the "enter a notesfile" option and type in the name "atari." Next, you'll see a box in the upper-left-hand corner of the screen. This box lists the titles of the notes in the file and the number of responses to each of them. Notes are numbered from "1" through "??;" up to 99 responses can be made to each note.

It's always a good idea to read the "policy statement" for a notesfile that's new to you before you start to use it, so you can make sure you understand what the file is about and if you should use it. You should use a notesfile only to discuss the subject it was designed to cover.

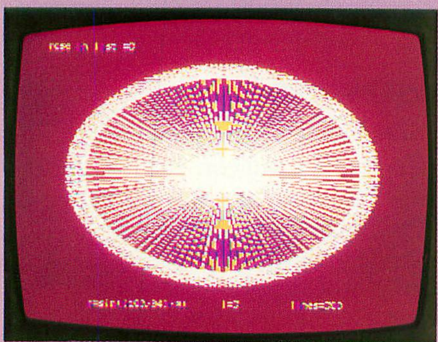
For instance, you can talk about Atari machines and related topics in =atari=. Microcomputers of all kinds are discussed in =micronotes=. Political discussions are held in =forum=, and =pad= is the place for offbeat humor.

When you have a chance, read the =atari= policy note. Surprise: David left it! It includes the date and time he

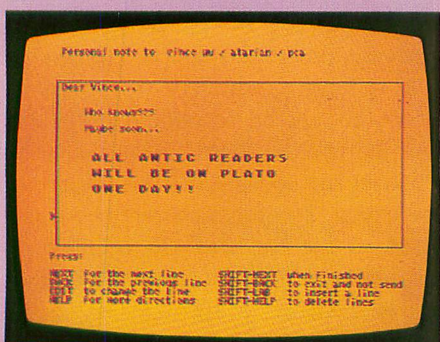
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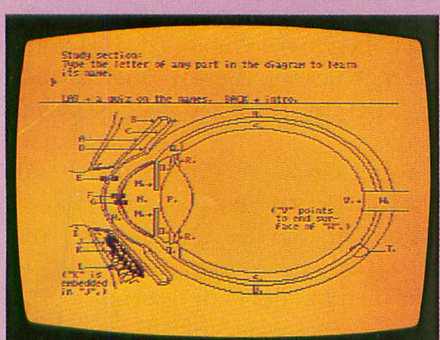
This illustration of a graphing equation is taken from PLATO's "Rose" (=0rose=) program.



Another sample of a graphing equation, this screen shot illustrates the user's ability to alter background and foreground color and luminosity.



PLATO's personal note (email) program allows you to send notes to users on other (linked) computers.



In "Eyeq" (=0eyeq=), graphics and animation are used to reveal the eye's anatomy.

left the note, along with his signon, and is an example of a typical note on PLATO, whether it's a personal note (or mail, which is designated for one person) or a group note (or a notesfile, open to anyone who wants to read it). Each note can be a maximum of one page in length.

ACCESSING NOTES AND RESPONSES

After reading the =atari= policy note, press [RETURN] and you'll be back at the =atari= notesfile page. Pick a note that looks interesting and type in its identifying number. For instance, a note's title might be "850 Interface" and its number 134. To access it, type in 134 on the "What Note?" line. The note will then appear onscreen, along with the date and time it was left and the name of its author.

If there are any responses to the note, you'll be prompted to "Press LAB to see response." You access the responses, one at a time, through successive presses of LAB. These responses are not the main notes, and do not appear on the notesfile index page. They are simply responses to the "base" note. If you want to leave a comment about a base note, leave it as a response; if you'd rather start a whole new note, leave a new base note instead.

There are currently more than 100 notes in =atari=, some of them going back more than two years. Hundreds of responses are also listed, and =atari= is not even a particularly active notesfile! The busier files, such as =micronotes=, are winnowed down on a daily basis — they receive hundreds of notes and responses every day.

A LIST OF POPULAR NOTESFILES

Some of the more popular notesfiles are listed below. Bear in mind, however, that there are more than 10,000 notesfiles currently active on PLATO (most of them dedicated to very specialized purposes); this selection is intended to cover only a few of the most widely used files.

- =forum=. If you have a yen to discuss politics or current events, =forum= is for you. It includes input and opinions from all points on the political spectrum, so feel free to jump up on your soapbox and spout off.
- =micronotes=. An extremely busy file that consists of news and discussion of microcomputers of all kinds. Questions are most welcome. Currently, Apple's new Macintosh computer is a hot topic, and six pages of Mac specifications are available, but there's also plenty of news about Atari, IBM, and other micros and microprocessors.
- =pad=. A great place to let loose. Look into it for yourself; it's impossible to describe.
- =parents=. The place to ask questions — and get answers — about raising children. Right now, someone wants to know when to let their teenage daughter use makeup.
- =tavern=. A notesfile dedicated to "labyrinth," a fantastic underground-dungeon game.
- =starbase=. This file is used by the Federation Team in the interstellar game =empire=. Other notesfiles are used by the game's other teams, the Kazars (formerly the Klingons), the Romulans, and the Orions. New members are always welcome; if you're interested, leave a message at the door.
- =womannotes=. A place to discuss women's issues. Right now, the ERA (Equal Rights Amendment) is the main subject under consideration.

PERSONAL NOTES

To move out of notesfiles and into Personal Notes, press Shift-BACK several times and then select the Personal Notes option. As a new user, you won't have any incoming mail (or "pnotes") to contend with right away, but active PLATO users receive and generate all sorts of mail. By the way, a pnote cannot be read by anyone — including the PLATO system's staff — other than its intended recipient. Your privacy is closely guarded by the system and its staff.

As a PLATO user, you're likely to spend a great deal of time in Personal Notes, because they're a great way to communicate with other users. Again, like all notes on the PLATO system, pnotes can be a maximum of one page in length. The system automatically lets you know when you've received a pnote.

ASKING FOR HELP

When using the PLATO system, you can ask for help at any time by pressing the HELP key (Start & H). On-line help will be made available immediately, and all the options open to you in a given situation will be explained. Don't be afraid to follow the instructions you are given — much of the material in this article is available through HELP, and, in fact, it was the source of much of the material that appears in this article.

In addition, lessons about using Personal Notes, Notesfiles and TERM-talk are offered in PLATO's voluminous library, which is listed in the main menu. PLATO is more than happy to teach you everything you need to use it.

PLATO'S GAMES

Let's take a look at the selection of games available on PLATO. After all, PLATO was a great source of games — many of them involving more than one player — long before the Atari even existed. You can compete against, or work with, other users from around the U.S. or around the world. What a great way to play! The only thing I know of that compares to it for the Atari is **COMM-BAT**, a two-person game from Adventure International, and even COMM-BAT doesn't really compare to the classic PLATO games.

An entire section of the PLATO library is devoted to games. It includes all the games you could possibly want. Look them up — the following are just a few of the highlights:

- =moria= and =labyrinth=. These are classic dungeon games in the Dungeons and Dragons mold. You can play them by yourself or with a group of other users. They offer you the chance to explore multiple-layer dungeons filled with deadly traps, monsters galore and great treasure. Along the way, you accumulate experience, wealth and magic weapons. You can also help others in your group if (when!) they run into trouble.
- =drygulch=. This mining game features a mine and ghost town with supernatural characteristics.
- =empire=. *The* space game — it has no equal. As many as 32 players, each working a separate terminal, can command spaceships involved in a battle for control of the galaxy. Four teams struggle day in and day out, every second the system is up, to conquer the universe. To do so, your team must take over the other teams' home systems along with a number of independent planets, but — remember — at the same time the other teams are trying to do the same thing to you.

A help lesson for =empire=, complete with tips for beginners, is available on PLATO; be sure not to miss it. And get ready for some of the fiercest, fastest gameplay you've ever encountered.

We should mention that one of the designers of =empire= is Chuck Miller ("chuck miller / pso"), one of the system consultants mentioned earlier. If you like =empire=, drop him a note and tell him. He's devoted a great many hours to making =empire= the best possible game of its kind.

=0airfight=. This dogfight game features 3-D graphics, and is superior in many ways to any of the flight-simulator games on the market.

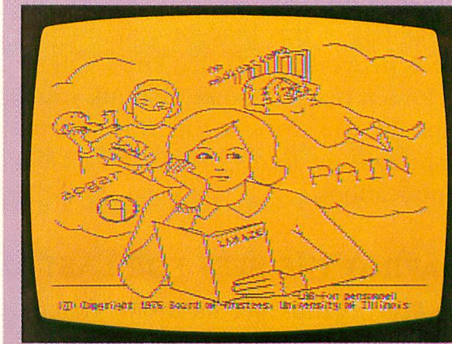
ADMISSION TO A NEW SOCIETY

We've been trying throughout this article to emphasize the human side of PLATO. Many people have met on PLATO, and quite a few romances, marriages, and lasting friendships have resulted. We can't even begin to count the number of friends we've made on the system. PLATO is *about* people — it's not just an educational network. In effect, for a very low admission charge, PLATO offers you the chance to join the world's first electronic society.

We've made friends with fellow PLATO users from places as diverse and distant as England, Sweden, Venezuela, Belgium, Australia and Alaska. This new society is scattered across the face of the globe, and it gives you the opportunity to meet an incredible number and variety of people.

The Atari PLATO cartridge itself is only $49.95, and connect time on the system is apparently going to cost about $5 an hour. This puts PLATO in the same league with CompuServe and The Source in terms of cost, but in other respects there's no comparison. Compu-

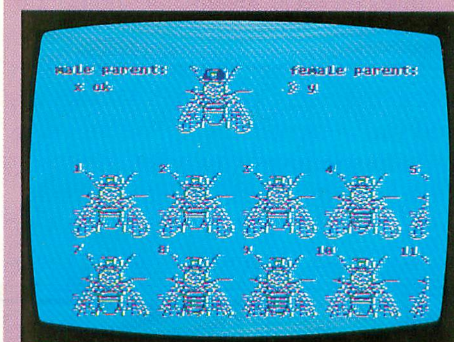
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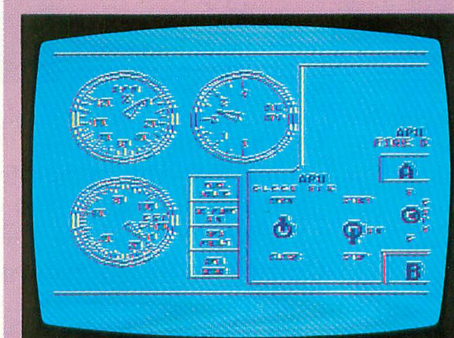
"Lamaze" (=0lamaze=) is a tutorial that prepares women and their partners for childbirth.



Players all over the country wander through the 248 mazes of "Moria" (=0moria=), PLATO's most popular dungeon game.



"Fly" (=fly=) offers an interactive course in genetics that includes the cross-breeding of fruit flies.



The "apu747" (=0apu747=) simulation by Boeing Aircraft teaches ground crews how to start a jumbo jet with an auxiliary-power-unit truck.

Serve is just beginning to explore the potential of this kind of communications network; PLATO has known about it for ten years or more. We think you'll find PLATO to be a superior system, especially in terms of its educational applications.

SAVING THE BEST FOR LAST

PLATO began as an educational system, and, indeed, as an experiment to determine how computer-based education could be most effectively explored. Because of these roots, PLATO places a heavy emphasis on computer education. In fact, that's all CDC wants to talk about. Perhaps they haven't yet realized that the communications aspects of the system are a potential gold mine for them. If the Atari community hooks up to PLATO in force, though, CDC may finally see the light.

At any rate, as we mentioned earlier, there are more than 200,000 hours of courseware available on PLATO, which means that you'd literally have to spend 200,000 hours in front of your Atari to go through the entire PLATO library. Courses on every imaginable subject are included.

Would you like to learn about sentence structure? Go to the PLATO library and run =0sentences=. This amazing little lesson gives you a list of words such as "boy," "girl," "dog," "carries," "over," "under," and so on, and asks you to construct a sentence out of them (e.g., "The boy carries the dog over the car to the girl."). In a few seconds, an animated sequence appears on the screen, showing a boy carrying a dog over a car to a girl. This is an extremely powerful teaching tool, and quite a programming feat as well.

Having trouble with arithmetic? PLATO abounds with lessons on everything from the fundamentals of math to the mysteries of calculus. Interested in chemistry? PLATO can show you how to set up a distillation apparatus for a sample experiment, explain how to proceed with the experiment itself, and even show you the end result — an imaginary explosion — if you let the solutions get too hot.

PLATO's role is to help you learn, not to make you fail. Its lessons are not designed with failure in mind. If you're having trouble, you can press HELP (or be taken to help automatically) as often as necessary until you understand the lesson. PLATO is the epitome of individualized education — it's like having a powerful and extremely patient teacher who's been assigned to work with you on an individual basis. No deadlines are involved, and there is no peer pressure to contend with.

A FINAL NOTE

We'd like to take this opportunity to thank Vincent Wu, the designer of the Atari PLATO cartridge, Atari Inc. and Control Data Corporation for putting PLATO within virtually everyone's reach. As Atari users and observers for four years now, we're convinced that the introduction of the PLATO cartridge is the most significant event in the history of the Atari home computers.

This one step has given the Atari access to many megabytes of memory, thousands of man-years of software and experience, the incredible computational power of a Cyber 800 mainframe computer, and the best communications network in existence. The Atari has become a supercomputer! But PLATO's most powerful selling point is its element of humanity — its ability to put you in touch with all those other users out there. This feature should make it very seductive to Atari computerists, many of whom are used to working by themselves on a machine day after day, or night after night. Suddenly, all of you, you're no longer alone.

David and Sandy Small are professional programmers who work extensively with Atari computers and Atari-compatible peripherals to create software for the Atari. They've spent several months testing a prototype of the Atari PLATO cartridge, which is scheduled for release later this year.

Antic is planning to maintain an =antic= notesfile on PLATO. It will be open to all users who want to leave questions or comments. To sign on, type "b" for electronic mail, "n" for notesfiles, and "antic." —ANTIC ED

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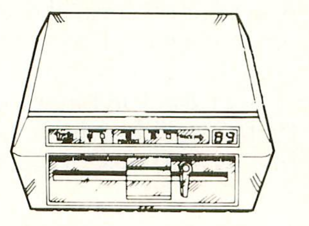
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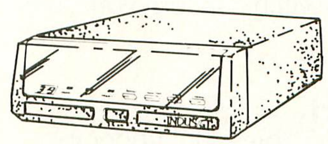
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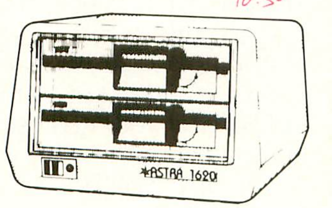
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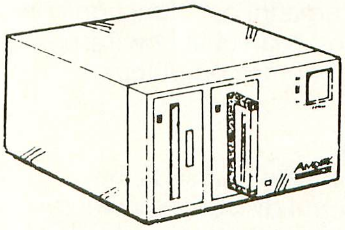
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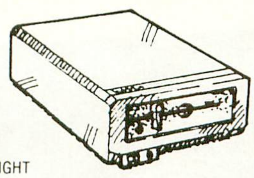
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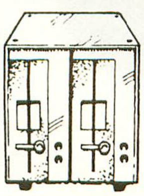
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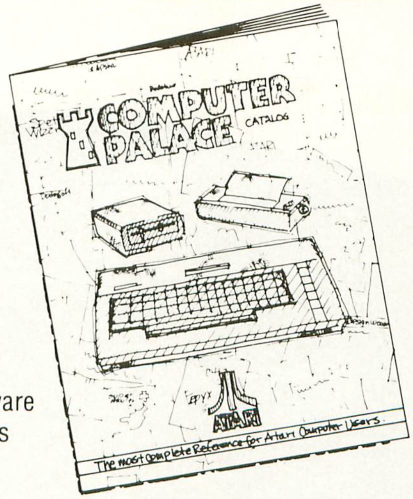
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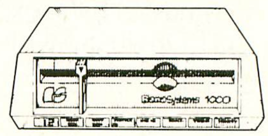
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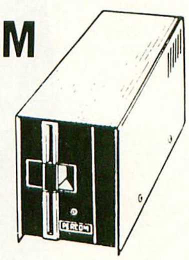
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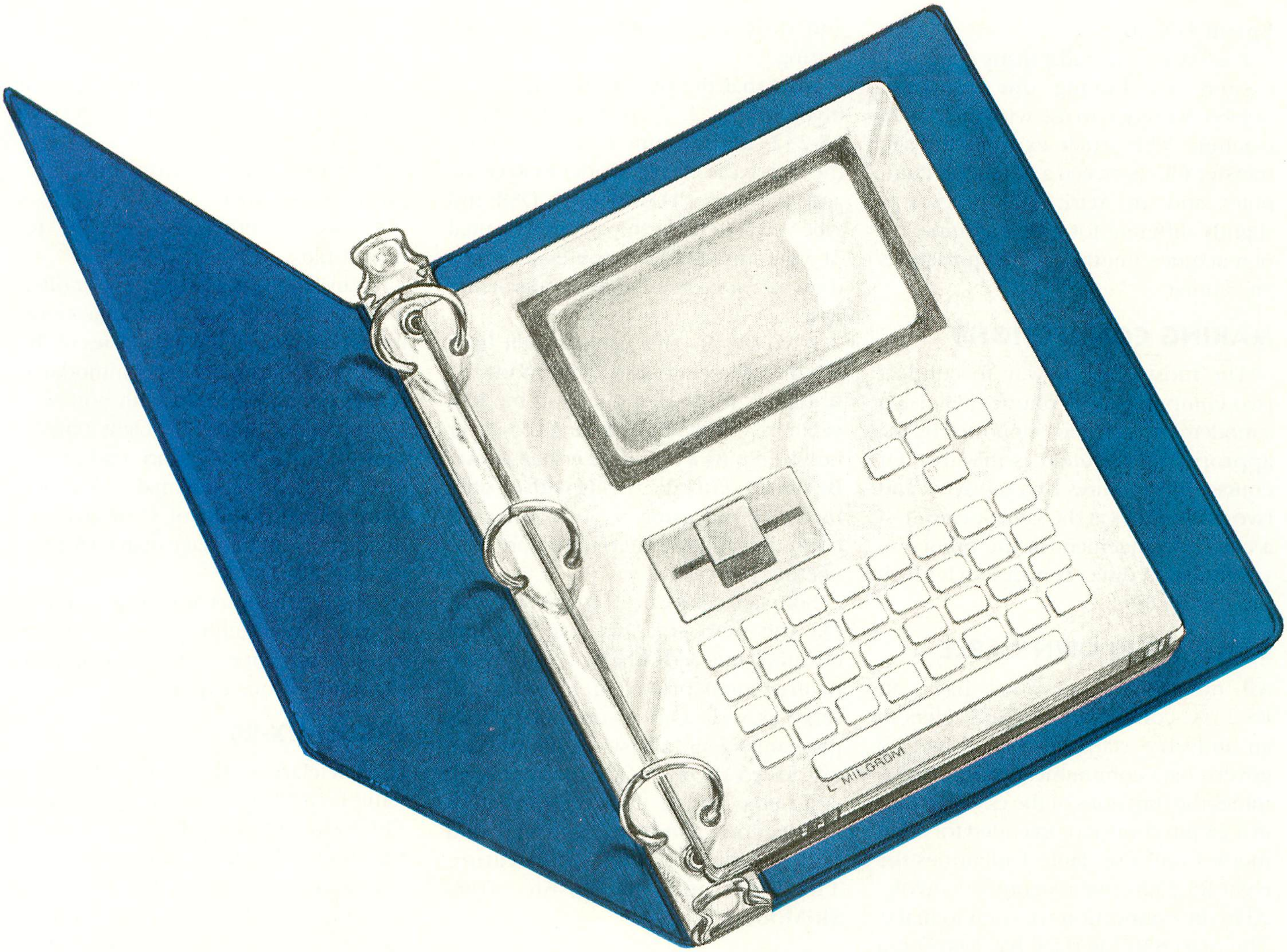


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ELECTRONIC NOTEBOOK

An Atari, a cable and a lap-size computer

by ROBERT SIEGLE, BOB KAHN & THE ANTIC STAFF

Notebook computers are the latest rage in the microcomputer world. These book-sized machines are very light and portable, yet feature large amounts of RAM, full-sized keyboards, built-in software, and much more. Because they hold every character in "non-volatile" memory, there is little drain on the computers' batteries. This keeps memory from being erased when the machines are switched off.

SYNOPSIS

This article discusses the transfer of data between "notebook" computers and Atari personal computers. An 850 Interface is required. For best results, you should use a commercial or machine-language terminal program that is capable of data transfer at rates up to 9600 baud for the Atari.

With a notebook computer, you can write or program anywhere — on a bus or plane, while sitting in the park, or even lying in bed. Later, you can transfer the file to your Atari to add some finishing touches. You can then print out the text or save it to disk or cassette.

At this time, there are three major notebook computers that retail for approximately $795; Radio Shack's **Model 100**, the **NEC PC-8201A** and the

continued on next page

Epson HX-20.

It is already clear that many computer owners are buying one of these notebook models to use with their main machine. This article explains how to transfer files between a notebook computer and an Atari. The process is slightly different for each combination of machines, but the guiding principles are similar.

MAKING CONNECTIONS

The most obvious way to connect two computers is by phone line, using a modem on each end, supported by the appropriate terminal software. Of course, this requires two modems and two phone lines at the same location — a costly arrangement in the home environment. A direct connection is much more desirable.

BUILD YOUR OWN CABLE

All notebook computers have an RS-232C connector. RS-232C refers to an industry standard established to govern data communications. It determines the functions of the essential pins in a 25-pin connector intended for communications use. Table 1 identifies the eight RS-232C pin assignments involved in the connection we want to make. The Atari 850 Interface has four 9-pin serial ports. Port 1 (850SP1) is the most fully configured, and is the one we will use.

Note that both ports are female, so you will need a 25-pin male connector (DE-25), a 9-pin male connector (DB-9), and several feet of cable with at least eight wires in it. The pins are numbered from top to bottom and right to left as you face the female plugs, and left to right as you face the male plugs. Be careful to properly identify the male pins and their corresponding wires while wiring.

Note that the significant differences involve pins 2, 3, 6 and 20 on the RS-232 side and pins 1, 3, 4 and 6 on the Interface side. Send goes to Receive, and vice versa. DTR goes to DSR and vice versa. Refer to the owner's manual of your non-Atari computer to verify these pin assignments in your particular case.

If you make this cable, you'll have what's referred to as a "null modem." It differs from the standard modem cable by virtue of the wiring crossover between pins 2 and 3 described above. Be sure to verify the wiring with an ohm meter before using it. Turn off each computer and the interface before connecting the cable.

Software takes care of everything else. On the Atari side, we use **TeleTari** (Tronix), but **AMODEM**, a public domain program printed in this issue, will serve as well. Other communications programs should also work, but we have not tested them. As for the notebook computers, each has built-in communications software. The NEC and Radio Shack Model 100 feature **TELCOM**, and the Epson offers **SkiModem**.

BASIC PROCEDURES

The details vary, but in all cases you must complete the following steps:

- Connect the two computers with the null-modem cable.
- Power-up the computers and interface.
- Load the appropriate communications program into the Atari.
- Call up the communications program in the portable.
- Adjust the status of each communications program to match the other.
- Set one of the computers to send (upload) and the other to receive (download).
- Transfer the file from one computer to the other.
- Save (or otherwise use) the received file.

"Translation" is a term you hear often in the context of Atari communications. It refers to several idiosyncrasies of the Atari that must be accommodated before communication with non-Atari computers is possible. "Light translation" converts the Atari end-of-line ([RETURN]) from decimal 155 to the standard ASCII value of 13 or vice versa. See the 850 Interface manual for further details.

The instructions for your terminal programs will guide you through the further formalities. The following are examples of our experiences.

EPSON HX-20

Load TeleTari on the Atari and set the status for 4800 baud and no translation. The rest of the default parameters are fine. Set up the Skimodem program according to instructions. Use a value of 246 for x and 104 for y. If your baud rate of transfer is 300, use a value of 40 for y. Once Skimodem is running, the two computers can "talk" directly to each other; whatever you type on the Epson appears on the Atari's display, and vice versa. As long as each modem program is saving transmissions to its buffer (a special holding area in memory), you can save everything to disk or cassette later. If you use this method extensively, use 300 baud — we lost too many characters at 4800 baud.

To send text files from the Epson to the Atari, load your document into the **SkiWriter** program's memory *before* you load and execute Skimodem. We had no problem with transfers at 4800 baud. The main hitch with this technique is that you lose control characters (most notably linefeeds). Once you have the document in your word processor on the Atari, go through and add linefeeds and other control charcters wherever this is necessary. It isn't much fun, but it beats retyping.

If you want to write BASIC programs

Table 1
Pin Assignments for RS-232C/850SP1 Connection

Pin	Description	Goes to 850 Pin
2	T×D—Transmit Data	4 Data In
3	R×D—Receive Data	3 Send Data
4	RTS—Request to Send	7 RTS Out
5	CTS—Transm. Auth.	8 CTS In
6	DSR—Data Set Ready	1 DTR Out
7	GND—Signal Ground	5 Sig. GND
8	DCD—Data Carr. Detect	2 Carr. Det. (CRX, In)
20	DTR—Data Carr. Ready	6 DSR In

for the Atari on the Epson, first reset some of the parameters on the Atari terminal program. Use 300 baud and light translation (to allow carriage returns to be translated from ASCII to the internal Atari code, ATASCII. Then type the following sequence of commands on the Epson:

```
OPEN "O", #1, "COM0:(28N1D)"
  [RETURN]
CLOSE #1 [RETURN]
LIST "COM0:" [RETURN]
```

These commands should be executed from within the program area holding the BASIC program you wish to transfer. The first two lines set the Epson's RS-232 port to match the Atari's terminal program; the third (to which you may add line ranges) actually lists the file to the Atari.

RADIO SHACK MODEL 100

Connect the computers with your cable. Then load and run your Atari terminal program. Set it to 9600 baud, full-duplex, and use default settings for the other parameters.

Next, select the TELCOM program from the Model 100's menu. The status line in the screen's upper-left corner should read:

87I1E, 10 pps

This tells TELCOM that you want to communicate at 9600 baud with seven-bit word length, no parity, one stop bit, XON/XOFF enabled, and 10 pulses per second for auto-dialing. If TELCOM doesn't show these settings, press [F3] and type in the above string, followed by [ENTER] in response to the STATUS prompt. Now press [F4] to put TELCOM in terminal mode.

DATA TRANSFER: MODEL 100 TO ATARI

Set up your Atari terminal program to receive and activate the transmission. Next, press [F3] on the Model 100 to request Upload. TELCOM will then ask you for the name of the file you want to move. Type in the name, including the extender (e.g., MOVER.DO) and press [ENTER].

TELCOM next prompts you for line width. Press [ENTER] without typing anything else; otherwise, TELCOM inserts a linefeed after each line. As soon as you do this, the highlighted word "UP" appears above [F3] and data transfer begins. You should see the text appear on your monitor screen as soon as the Atari receives it. You won't see the text on the Model 100 screen.

Every time the Model 100 sends a carriage return, the cursor writes over the current line without skipping down to the next. Even though you lose data on the screen, the Atari receives everything in the file. However, it will be necessary later to edit the text file on the Atari.

DATA TRANSFER: NEC TO ATARI

To transfer text from the NEC to the Atari, first create a text file with the NEC's **TEXT** program. Then enter TELCOM. Since TELCOM is set up for 9600 baud, you needn't change any of the parameters. Load TELETALK on the Atari with the 850 connected and turned on. Follow directions to change TELETALK's baud rate to 9600. If you use a terminal program that allows you to set translation, set it to light translation. On the NEC, press [F5] to enter TERM. Next, press [F4] for Upload. At the prompt, type in the name of the file you wish to transfer. Transfer begins automatically after you enter the file name (if the file exists), and the text appears on the Atari screen. To save the text to a disk file, press [START], then [S] for Save text, and then type in a file name after the prompt 'D:' and press [RETURN].

DATA TRANSFER: ATARI TO NEC

To transfer text from the Atari to the NEC, it's best to use a terminal program on the Atari that offers the light translation option. This converts Atari EOL (155) to ASCII EOL (13), so the Atari's EOL's won't show up as carats throughout the text file on the NEC. Unfortunately, TELETALK doesn't let you change translation.

If you use TELETALK, set it for 9600 baud, and then go to the main menu and press [U] for Upload. Enter the file name at the prompt and wait for TELETALK to load the file. At the next prompt, press [RETURN] to return to the main menu. Enter TELECOM and set it for 9600 baud as above. Then enter TERM and press [F5] for downloading. Type in a file name at the prompt. At this point, the word "Down" appears (over [F5] in inverse notation. Next, on the Atari, press [S] for Spool Text from the main menu. When the prompt 'D1:' appears, backspace to the 'D' and type R1: [RETURN]. Transfer will now take place.

If you use some other terminal program, make sure that translation is set to light. The normal Upload procedure (not the one described above, but the one described by the terminal program's documentation) should work for programs other than TELETALK.

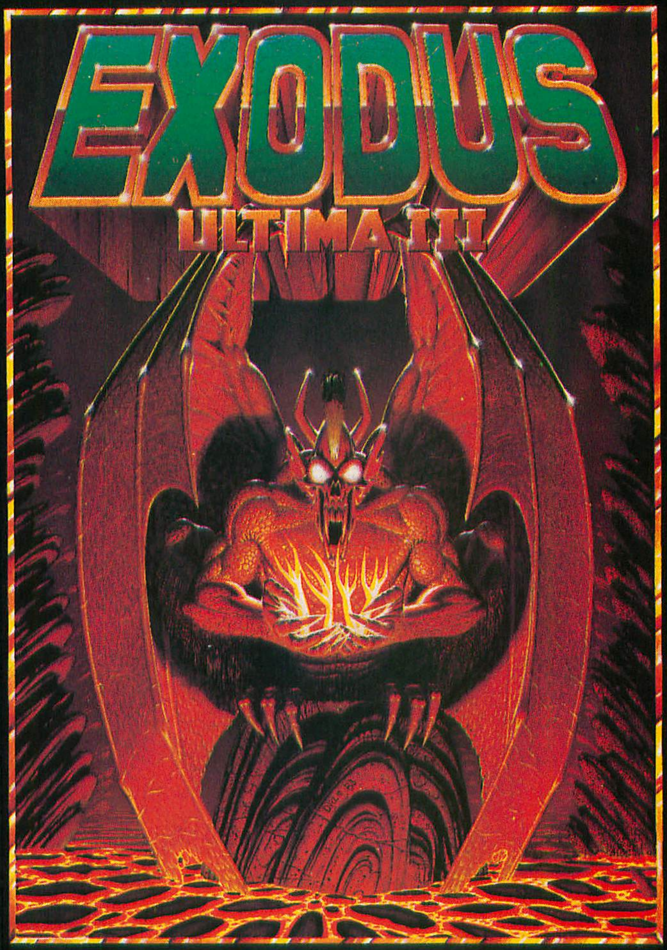
If you have any problems with data transfer, try using a lower transfer rate, such as 4800 or 2400. Even 1200 is tolerable. Also make sure that both the Atari terminal program and TELCOM are set at the same transfer (baud) rate.

THE NEXT STEP IS UP TO YOU

The cable and procedures outlined in this article give you the opportunity to move into the world of notebook computers without leaving your Atari behind. We've covered the three major book-sized computers that are currently available. The next step is yours. Your Atari can be an integral part of your move into the realm of easily transportable computers. It can interface with all of the major products on the market today, and can provide benefits and features that no notebook computer can match. If you have an Atari, and a friend has an Epson, a NEC, or a Model 100 notebook computer, you can transfer files between the two computers and easily share your computer experiences. And this technique (with some modifications) can work with other kinds of computers as well. The opportunities are definitely out there; look into them — and let us know what you discover.

Robert Siegle is an associate professor of English at Virginia Tech. He uses his Atari 800 and an Epson HX-20 notebook computer to handle a number of research, writing and management projects. Bob Kahn works for Dorothy Derringer in the Learning Systems Group at Atari, Inc.

"A LIVING TAPESTRY . . ."



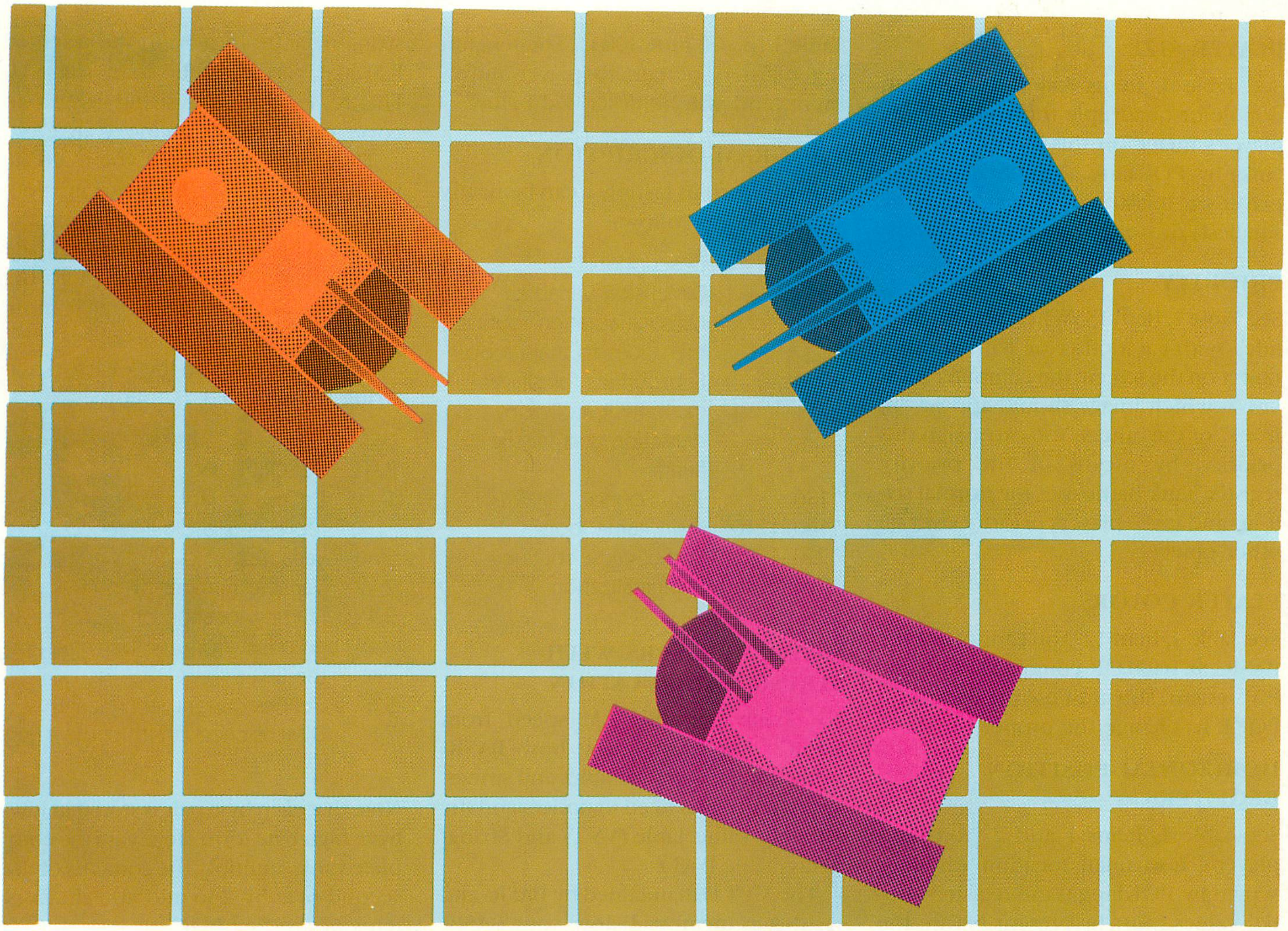
"The world of Ultima III can only be compared to a living tapestry — complex and beautiful . . . This is the best fantasy game in computing. Indeed, it is one of the best fantasy worlds in which to live. Lord British is a veritable JRR Tolkien of the keyboard." — Popular Mechanics

"Exodus: Ultima III, with a superior plot to match its superior gaming system, is a great game. It upgrades the market; in several ways it sets new standards for fantasy gaming state of the art." — Softline

"Exodus: Ultima III is Lord British's magnum opus — so far. It's fun and exciting to play and constantly intriguing. And the ending is marvelously unexpected and not a bit disappointing — except that it is the ending, and as with a good book, you'll probably wish there were more." — Softalk

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THE SECRETS OF BASIC ANIMATION

Enhance your games in BASIC

by FRED PINHO

Last month's article gave you an introduction to the Player/Missile (P/M) system. This month, I'll finish discussing the P/M registers listed in Table 1 last month and explain in depth how the program works.

SYNOPSIS

*This article concludes a two-part series on Player/Missile animation through BASIC. See "Use BASIC To Animate" (**Antic**, p. 46, June 1984) for the first article in the series as well as the accompanying program listing (Tank Battle) and Tables 1 and 2. Tank Battle is a four-player, tank-battle game that requires 32K. (XL owners should modify the program as specified in the first article.) The goal of this tutorial is to teach you how to use BASIC to move players and fire missiles both horizontally and vertically.*

continued on next page

PLAYER SIZE

See Table 1, Items 3 and 4. You can double or quadruple the width of the player's image (in this game, that of a tank) by POKEing a number into the player-size register. My program uses the smallest, or normal width for players.

PRIORITY

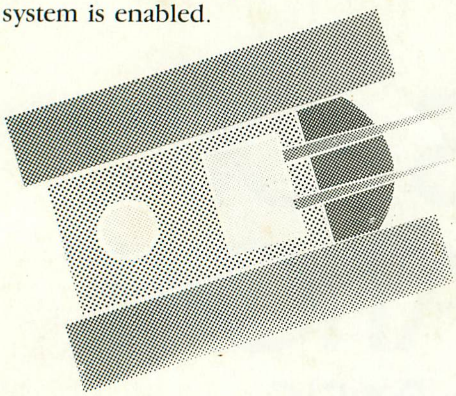
See Table 1, Item 13. When players "collide" with each other or with another object on the screen, the computer must know which image should appear "in front" of the others. You can assign this priority, by means of the priority register. Tank Battle uses the normal setting, and gives players priority over all other objects.

PLAYER COLORS

See Table 1, Item 12. You cannot use the BASIC SETCOLOR command with the P/M system. You must use the command POKE to change the proper registers.

HORIZONTAL-POSITION REGISTERS

See Table 1, Items 1 and 2. You set a player's horizontal location on your screen by POKEing these registers. Initial values must be present before the system is enabled.



ENABLING THE P/M SYSTEM

See Table 1, Items 15 and 16. Once you've set up the above registers properly and stored the data for each player in memory, you must turn on the system. Two registers control this: DMACTL (Direct Memory Access Control) and GRACTL (Graphics Control).

DMACTL, for our purposes, sets P/M resolution; it must be set for the system to function. POKE GRACTL with 3 to enable the Player/Missile system. To turn the system off, POKE GRACTL with 0.

This covers most of the registers in Table 1 (p. 48, June 1984). The remaining registers pertain to player movement, and will be described below.

PROGRAM DESCRIPTION

The program in Listing 1 can be neatly subdivided as follows:

Line #	Description
10	DIMension variables
20	Calls initialization routine, then goes to main loop.
30–1140	Subroutines for player movement, collision detection and missile firing
1150	Tank Sound
1160–1210	Main game loop
1220–1280	End-of-game routine
1290–1540	PM Initialization

MOVING PLAYERS WITH STRING MANIPULATION

To obtain passable P/M speed from BASIC, you must know how BASIC stores and retrieves variables and strings. Specifically, you need to understand the Variable Value Table (VVT) and String/Array Table (SAT).

The VVT is maintained by BASIC and resides in memory below your BASIC program (see Figure 1, p. 50, June 1984). BASIC automatically makes an 8-byte entry in this table for each variable, array and string that you write in your program. These entries are made in the order in which BASIC encounters each of them. You can obtain the table's memory address with the following formula:

VVT = PEEK(134) + 256 * PEEK(135).

The SAT, which resides above your BASIC program, stores the actual string and array data. Space is reserved for it by DIMension statements. To find its memory address, use:

SAT = PEEK(140) + 256 * PEEK(141).

BASIC manipulates strings quickly. You should use the following techniques to move players via string manipulation. First, DIMension the strings that are intended to hold P/M data. Initially, you should DIMension them to one byte so they'll be entered into the VVT. Then, using POKE statements, change the memory address in the VVT so that the string data are located in the reserved P/M data area, rather than the SAT. Finally, expand the string length to cover each player's memory area.

These steps will allow you to create vertical motion by using string manipulation (moving data around within the string). This technique gives you the same effect as POKEing data into the P/M area, but it does so much more rapidly.

The 8-byte entry in the VVT for each string is structured as follows:

BYTE	DESCRIPTION
1	Defines variable type. 129 represents a dimensioned string variable.
2	Variable number (0–127)
3,4	Starting location of the string as an offset from the beginning of the SAT.
5,6	Defines current string length.
7,8	DIMensioned length of the string.

Note that each byte pair is stored in low-byte, high-byte form. To obtain the complete value, multiply the contents of the second byte by 256 and add the contents of the first byte.

LINES 1290–1300

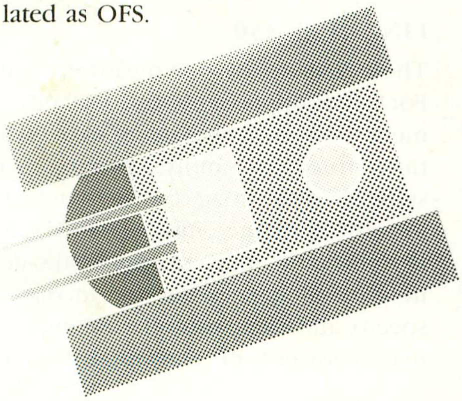
Unless you fill P/M memory with zeros each time you run the program, leftover data from a previous program may appear on the screen. Normally, you'd use a loop to POKE 0 into each location, but this takes too much time in this application. Instead, simply declare a graphics mode whose memory requirement is larger than the one you plan to use. This causes the Operating System to automatically zero (set to zero) the screen memory. These lines call Graphics 8 + 16 (full screen) first, and then Graphics 5.

Next, calculate the proper setback from the top of RAM (in pages), and POKE that value into location 54279. Then calculate the actual value of PMBASE, and those of the VVT and SAT.

LINES 1310–1320 AND 1520

These lines modify the VVT. Note that the strings for each player (T0$ to T3$) and for the missiles (MSL$) were DIMensioned *first*. This makes it easy to find the proper entries in the VVT.

You must calculate the initial offset from the start of the SAT to PMBASE and place it in variable Z. Then, add each player's (or missile's) individual offset (stored as DATA in line 1520) to Z. The final offset to the player data is calculated as OFS.



Since this number is greater than 256, you must break it down into low (V2) and high (V3) bytes and POKE them into the third and fourth bytes of each entry in the VVT. In single-line resolution, each player's or missile's memory area is 256 bytes long. POKE the length of the desired string into the final two-byte pairs in VVT. Here, the low byte is zero and the high byte is one.

LINES 1330–1340, 1480–1510 AND 1530–1540

These lines place the player data (lines 1530–1540) into direction strings that contain an image for the direction in which a tank is to move. These strings (UP$, DW$, LF$, RT$) are loaded by the subroutines at lines 1480–1510.

The program loads the player strings (T0$–T3$) with the proper image, depending on the direction of motion, from the correct direction strings. As noted above, the computer thinks the player strings are in the P/M memory area. As a result, you see the image on the screen as soon as the player string is loaded. The creation of vertical motion is as simple as moving data back and forth within a player string.

Note that each player image is seven to eight bytes long, while each direction string is 14 bytes in length. Included in the direction string are a minimum of three initial and three tailing zeros. Since each player moves in steps of three, you need these zeros to erase any remnants of the previous image. You can maximize program speed using a single string manipulation both to move a player and to erase the old player.

LINES 1350–1360

Initialization of the horizontal-position registers occurs here. You must also zero all missile-position registers, initialize the number of missiles and set the firing-delay counters (D0–D3) to zero at this point.

LINE 1370

This line loads player strings with the proper initial image from the direction strings. It also sets the index variables (T0–T3) to indicate the starting position of the image within the string.

LINES 1380–1410

These lines set the size for players and missiles. You need to POKE in color values for players and background (black). The program turns the cursor off and then positions it to print the score line.

LINES 1420–1450

These lines draw the playfield. Note that lines are three times as wide as normal lines; this is done to ensure that the collision registers work properly. The program moves the missiles in steps of six with a FOR/NEXT loop for speed. If the lines weren't this wide, the missile image would either skip over or penetrate them.

LINE 1460

These strings move the missiles. Each 13-byte-long string contains six zeros, the value for the missile, and then six more zeros. The leading and trailing zeros erase any remnants of a missile image after it moves.

LINE 1470

This turns on the P/M system and returns to the main program.

LINE 1150

Here you set a single sound effect prior to entering the main loop. This is one of the compromises needed for faster execution in BASIC — fancy sound effects would slow the program down considerably.

continued on next page

MAIN GAME LOOP (LINES 1160 TO 1210)

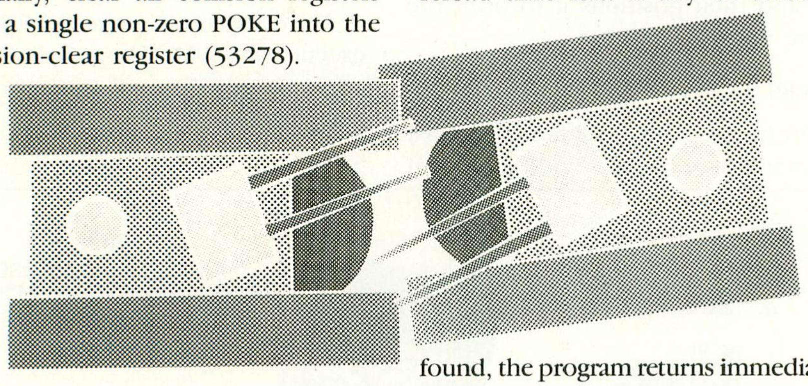
The main loop is only six lines long. Subroutines do most of the program's work.

LINES 1160 TO 1190

Each line here handles a specific tank. First, D0–D3, the reload delay counters, must be incremented. Then the program reads the joystick with a PEEK (I used Boolean algebra to simplify and speed this process). Once the direction has been determined, movement is executed by a subroutine.

Note that the subroutines are placed at the beginning of the Tank Battle program. When BASIC has to find a certain line, it always starts the search at the beginning of the program. As a result, if you place a subroutine here it reduces execution time significantly.

Finally, clear all collision registers with a single non-zero POKE into the collision-clear register (53278).



LINE 1200

This line determines if any tank has won the battle or if all tanks have exhausted their missile supplies. If either condition is met, the program branches to the end-of-game routine.

PLAYER-MOVEMENT SUBROUTINE (LINES 30–1140)

These subroutines move players, fire missiles, check for collisions, and update the score. They also make sure that the players stay in bounds (that is, on the screen). Since the set of routines is identical for each player, I'll just describe the routines for Player 0.

LINES 30–90

These lines produce movement to the right. H0 is the horizontal-motion index. Motion occurs in increments of four, which causes slightly jerky — but rapid — movement. This is accomplished by POKEing the horizontal-position register with H0. Then T0$ is loaded with the image for rightward motion from RT$; be sure to do this at the correct vertical position by using the vertical counter (T0).

Line 30 checks for a tank-to-tank collision. Note the line's short time delay. This was required for proper collision detection. If it finds a collision, the program decrements the horizontal index and rePOKEs the horizontal register.

Line 40 checks for a collision with a non-P/M object on the screen. If it finds one, it moves the tank backwards. In either case, the program immediately returns to the main loop to let the other players move.

Line 50 checks to see if the fire button has not been pressed, if the tanks are out of missiles, and if there is any reload time left. If any of these are found, the program returns immediately to the main loop.

When control passes to line 60, it means that a missile's been fired. The reload counter is then set to 0, and the number of missiles is decremented. MSL$ is loaded with 3 for Missile 0; the vertical counter TO is used to ensure that it's loaded at the correct vertical position. Next, the program moves the missile rapidly in steps of six. Rapid motion is necessary here, because all other motion stops while the missile is moving. If a collision occurs, the program breaks out of the FOR/NEXT loop prematurely (and uses POP to avoid disturbing the mechanisms BASIC uses to keep track of such loops). If a hit occurs, the score (S0) is updated and printed.

Note that when a RETURN is encountered at lines 70, 80, or 90, you must enter a zero into MSL$ to erase the old missile image. If you don't do so religiously, you'll wind up with a lot of unnecessary missiles on the screen!

LINES 100–160

These statements move players left. Look at lines 30–90 (right) for comparison.

LINES 170–230

These lines create downward motion. For this, as opposed to horizontal movement, you must use string manipulations instead of simply POKEing registers. Place the images, which move in increments of three, into T0$ (or MSL$). If you want to move players or missiles in greater increments (for increased speed), add a leading and a trailing zero to each image for each extra step taken.

LINES 240–300

These lines mirror lines 170–230 to produce upward motion.

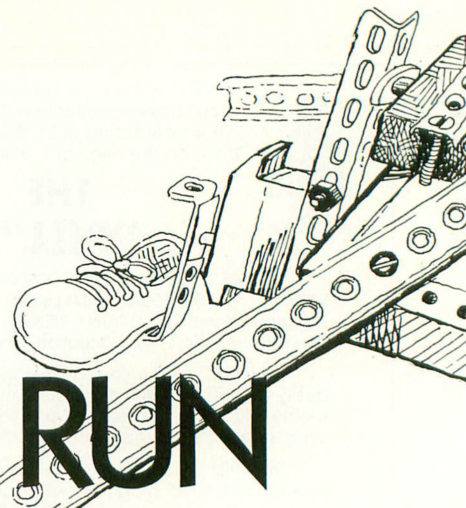
END-OF-GAME ROUTINE (LINES 1220–1270)

There's no time restraint, so you can modify this section as much as you like. Note that line 1280 zeros the graphics-data registers for all players and missiles. If you neglect to include this line, and then type RUN after the program ends, you'll see vertical bands of player/missile "garbage" on the screen until the P/M system is enabled again at line 1470.

CONCLUSION

Feel free to experiment with this program. Since it's written entirely in BASIC, any bugs that crop up will generate error messages without locking up your computer. As you modify the game, you'll find that you'll have to make a number of trade-offs: BASIC just isn't fast enough to do everything you might want. But after studying Tank Battle, you should be able to explore many of the exciting possibilities of Player/Missile graphics on your own. Many of these possibilities can be explored in BASIC; a knowledge of machine language is not required to have fun with Player/Missile graphics.

Fred Pinho is a biochemical research engineer and a self-taught programmer who is interested in BASIC and assembly language. The Atari 800 is his first computer.



RUN, ROBOT, RUN

Or at least move your leg

by EVAN ROSEN

This time we're going to connect a number of servos (as many as eight) and run them simultaneously. To do this, we need to generate accurate and consistent pulses of a duration between one and two milliseconds; these tell each servo where to position itself. The Atari Operating System (OS) performs many time-critical tasks, so there are only a few timeslots during which you can generate such impulses without being interrupted by the ANTIC chip as it updates the display.

So, to keep the code short, we'll turn ANTIC off while we generate pulses. As a result, the screen will be blank while the servos are running, but our code will fit into Page Six of memory (a free area in BASIC and most versions of Forth). There's room for listings in both languages this month. (Commands mentioned in this article will appear in the following format: BASIC Code /// Forth Code.)

SYNOPSIS

This is the fourth in a series of articles that discuss experiments in practical robotics that can be performed with Atari computers. The first three articles appeared in the December, 1983, and January and June, 1984, issues of ***Antic****. To benefit from the information and programs presented here, you should first read the other articles in the series and build the "robot." To do this, you'll also need either BASIC or Forth. To the best of our knowledge, the programs in this series run on all Atari computers.*

Figure 1 is a closeup of a leg that is made out of two servos and a few pieces from the **Erector**® construction set, but you also can use a different construction kit, or wire-hangers and a lot of patience.

The leg's upper servo, which we'll call the hip, is connected to the "knee" servo by means of an L-beam (the thigh). And the knee-bone's connected to the shin-bone. At the end of the shin is the foot. The shoes were a lucky find in terms of humor, but they also provide stability for the leg.

I also made one addition to the construction set. If you use the Erector® set, buy about two dozen 8-32 × 1½-inch flat-head machine screws to hold down the servos. I drilled the servo arms to fit the construction pieces (see Figure 2), but I suspect that five-minute epoxy will also work. Just keep the glue out of the works and away from the screw that holds the small servo-arm onto the servo.

WIRING

We covered this in previous articles, but here's a brief recap. The servos' black wires are all ground wires. They should be tied together and connected to pin 8 (ground) of a joystick port. Pin 8 is the third from the left on the bottom row.

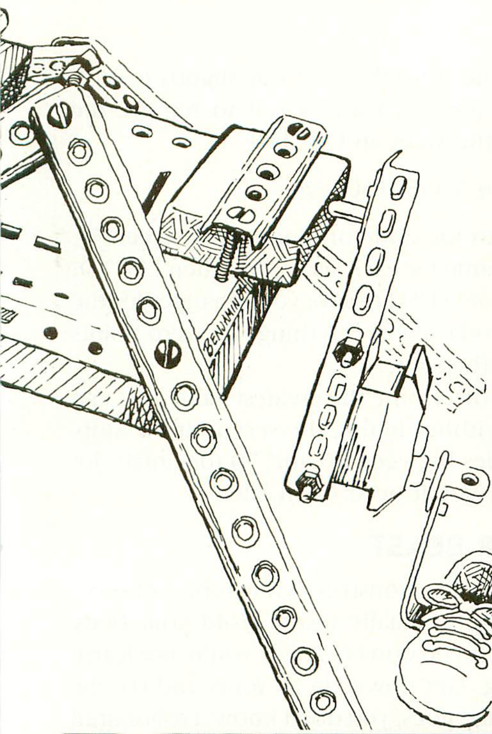
The red servo wires are all positive voltage, and should be tied to a 5V-DC (not AC) power supply. If you use a lantern battery, connect one or two diodes in series coming from it. This reduces the voltage from its nominal six volts to five. The 5V-DC power supply is not directly connected to the computer.

The third and final wire coming from the servo can be colored in different ways (e.g., white, orange, yellow, etc.). Each should be tied to a different pin in the range of 1–4 in joystick Ports 1 and 2.

WHAT'S A JOINT LIKE THIS DOING IN A ROBOT LIKE YOU?

Your first robot need not resemble the one pictured here. If you want to build something that resembles a living creature, think about the creature's form and how its various parts function in relation to one another.

Here's an example. In most bipeds, the shin can be extended (the knee can be bent all the way back) so that the calf touches the thigh. Most four-legged animals' hind legs bend backward, perhaps to aid in springing. Birds' legs are similar. Elephants' knees bend forward; perhaps this is good for strolling. At any rate, if you're clever, you can make your robot's knees bend 90 degrees each way so that the algo-



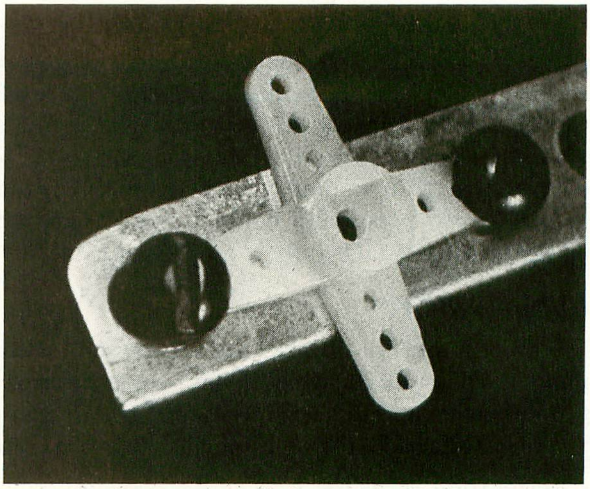


Figure 2
The servo arms were drilled to fit the construction pieces.

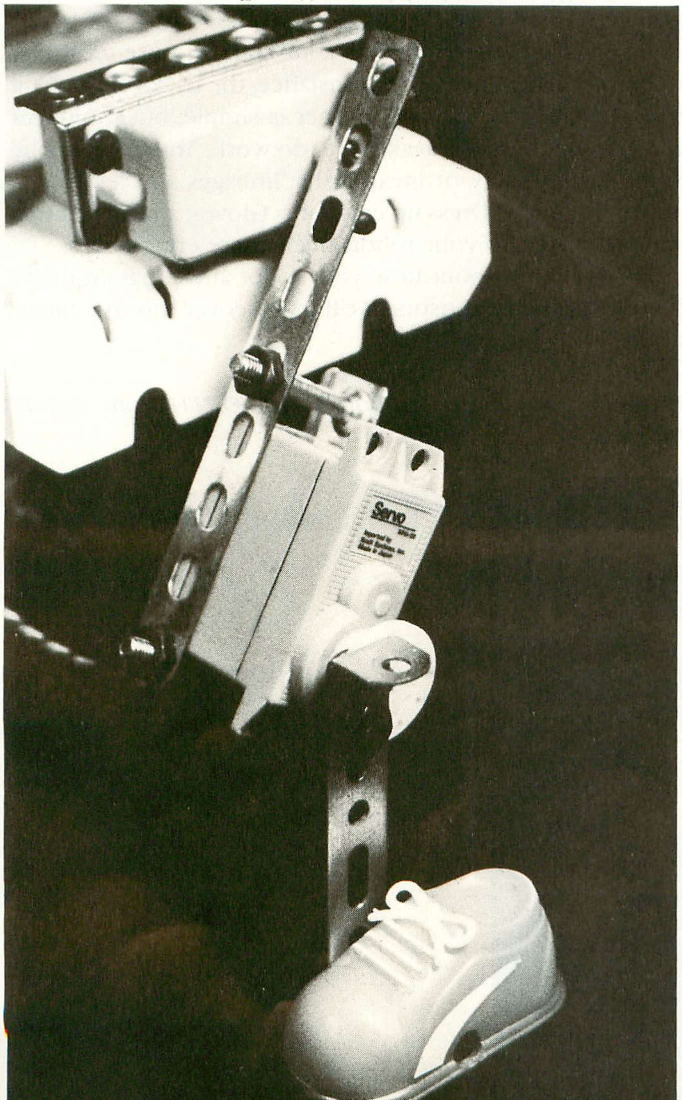


Figure 1 Even the simplest robot can be customized.

rithms for walking backwards are similar to the ones for walking forward. This can create problems with ground clearance, however. Build and learn.

FOUR LEGS GOOD, TWO LEGS BAD

Actually, six legs are best, which may explain why insects evolved before we did. Unless you give your robot extremely large feet, you'll have problems with stability with anything less than five legs.

Consider the horse, whose center of gravity lies along the center line of its body. When it lifts a leg, it has a tendency to tip over. To counter this, a horse can place a lifted leg down quickly, or can shift its weight temporarily to its other three legs.

Four legs' worth of servos can cost a lot of money, though! To use only two, we must bend the rules. My robot uses a frame made of four struts, which are partially visible in Figure 3. Like a baby's walking trainer, this frame keeps the robot roughly level. My robot's shuffling walk actually drags this frame along. See if you can do better.

HOW TO USE THE PROGRAM

Type in either the BASIC or Forth code. The program controls the first four servos with pins 1–4 on Port 1, and the next four with pins 1–4 on Port 2. You can attach up to eight servos for use with this program listing.

RUN the BASIC code to install the servo-driver routine, or do 50 LOAD from Forth. In Forth, screen 52's word SETUP installs the routine. To run a short test program, type GOTO 2000 from BASIC, or type TEST in Forth. If everything is OK, the screen will go blank and your servos will oscillate one at a time near their center positions.

If you let the demo run, it will stop by itself and the screen will turn on again. If you press [BREAK] before it stops, however, you'll need to follow this procedure to restore the screen. Press [SHIFT INSERT] to open up a line, then carefully

continued on next page

type GOSUB 1100 to remove the vertical-blank routine and the disable-POKEY interrupts. Note that the test program executes this subroutine before it ends, and that it starts with GOSUB 1000 to install the vertical-blank vector and the POKEY-interrupt enable. In Forth, use START to enable servo control, and STOP to disable it. To stop the Forth test program, simply press and hold a console key ([START], [SELECT], or [OPTION]) for a few seconds.

CALIBRATION

Now we'll "zero" or calibrate the servos, so that when you poke zero into a SERVOn (see below) location, the servo will go all the way to one stop and no further. You can jump in and out of servo-control by using the following commands:

GOSUB 1000 /// START
GOSUB 1100 /// STOP

Use these freely to turn the screen off and on while you make and check the adjustments. But be careful not to type the wrong number with GOSUB, or you may have to re-RUN the program or re-boot the system.

Note that there are eight addresses, SERVO0 to SERVO7, in each listing. There are also eight other addresses called OPULS0 to OPULS7. As in previous articles, the values in the SERVOn addresses represent the servo's position, and the OPULSn values determine where the servo will be when SERVOn's value is zero. To adjust the zero point for SERVO0, use:

POKE SERVO0,0 /// 0 SERVO0 C!

and then adjust the value in OPULS0. The initial value of all OPULSn's is 64 (decimal). You should POKE or C! numbers that are slightly greater or less than 64 into OPULS0 for centering. Don't use numbers below 10 or above 100, however, or you may create some timing problems.

You may have to reduce the OPULS0 value slightly to push the servo to its stop, and then increase it to remove the pressure. Next, print the value in OPULS0:

PRINT PEEK(OPULS0) /// OPULS0 C@ .

and edit this value into the code on line 530 /// screen 51, lines 5 and 6. Do the same for each servo, and then LIST"D:SERV8BAS" or CSAVE /// FLUSH to save your changes for the next session. If you don't rewire anything, the zero-points should remain about the same.

Finally, you should determine the greatest value that can be held by SERVOn without letting the servo hit the stop. This value generally lies between 50 and 70 (decimal). Jot these numbers down; you'll need them later.

DESIGNING YOUR BEAST

For helpful hints on how to construct your robot, observe how people and animals actually move. Hold your body rigid, then lift one leg. If you don't fall over, you're not learning — you're cheating. Get down on all fours and try the same thing. As the saying goes, you don't know a robot until you've walked a mile in its pod covers.

As you build, keep lengths adjustable and use creativity in constructing linkages. For instance, the trick of swinging one servo on the arm of another is simple, but it reduces the amount of torque available to do work. Your local hobby store has a variety of inexpensive linkages and levers.

And have fun! Dress up creations. Gloves, a face, or a tiny saddle can make your robot much more entertaining.

Finally, think about how your robot and program might handle data from sensors. We'll try to cover this in a future issue.

Evan Rosen is the co-author of Val-FORTH from Valpar International.

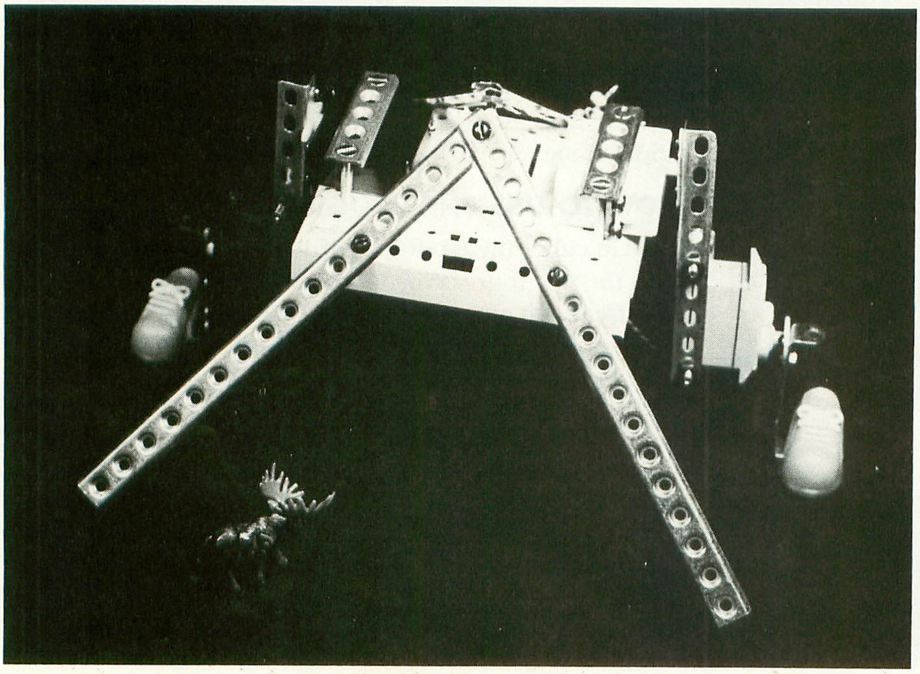


Figure 3 The robot's frame functions like a baby's walker.

```
100 REM 8 AXIS SERVO DRIVER
110 REM BY EVAN ROSEN
120 REM ANTIC MAGAZINE
140 POKMSK=16
150 DMACTL=54272:SDMCTL=559
160 AUDCTL=53768:AUDC2=53763
170 PACTL=54018:PORTA=54016
180 VVBLKD=548:VTIMR2=530
190 REM PAGE 6 POINTERS
200 SERVO0=1536:SERVO1=1537
210 SERVO2=1538:SERVO3=1539
220 SERVO4=1540:SERVO5=1541
230 SERVO6=1542:SERVO7=1543
240 OPULSE0=1544:OPULSE1=1545
250 OPULSE2=1546:OPULSE3=1547
260 OPULSE4=1548:OPULSE5=1549
270 OPULSE6=1550:OPULSE7=1551
380 REM SETUP
400 TEMP=PEEK(PACTL)
410 POKE PACTL,TEMP-4
420 POKE PORTA,255:POKE PACTL,TEMP
430 POKE AUDC2,160
440 POKE VTIMR2+1,6:POKE VTIMR2,79
500 FOR I=0 TO 87:READ X
510 POKE 1536+I,X:NEXT I
520 DATA 32,32,32,32,32,32,32,32
525 REM OPULSn-OPULS7:
530 DATA 64,64,64,64,64,64,64,64
540 DATA 0,0,173,17,6,141,0,211,14,17
550 DATA 6,174,16,6,224,8,240,16,24
560 DATA 189,0,6,125,8,6,141,2,210
570 DATA 141,9,210,238,16,6,96,162,0
580 DATA 142,16,6,142,8,210,142,0,212
590 DATA 232,142,17,6,165,16,9,2,141
600 DATA 14,210,32,18,6,76,98,228,138
610 DATA 72,32,18,6,104,170,104,64
620 STOP
1000 REM START
1020 POKE POKMSK,194
1030 POKE 54286,0:REM DISAB VBLANK
1040 POKE VVBLKD+1,6:POKE VVBLKD,51
1050 POKE 54286,64:REM ENAB VBLANK
1060 RETURN
1100 REM STOP
1120 POKE 54286,0:REM DISAB VBLANK
1130 POKE VVBLKD+1,228
1140 POKE VVBLKD,98
1150 POKE 54286,64:REM ENAB VBLANK
1160 POKE POKMSK,192:RETURN
2000 REM TEST
2005 GOSUB 1000:REM ANTIC OFF
2010 FOR K=1 TO 10
2020 FOR I=0 TO 7
2030 POKE SERVO0+I,PEEK(SERVO0+I)+20
2040 FOR J=1 TO 100:NEXT J
2050 POKE SERVO0+I,PEEK(SERVO0+I)-20
2060 FOR J=1 TO 100:NEXT J
2070 NEXT I:NEXT K
2075 GOSUB 1100:REM ANTIC ON
2080 END
```

TYPO TABLE

Variable checksum = 1938465

Line num range	Code	Length
100 – 220	PT	289
230 – 500	PV	273
510 – 610	LU	361
620 – 1150	VM	263
1160 – 2080	YX	242

```
Screen: 50
( CONSTANTS ***** EWR/ANTIC MAG )
: EQU CONSTANT ; HEX
  10 EQU POKMSK
D400 EQU DMACTL   22F EQU SDMCTL
D208 EQU AUDCTL  D203 EQU AUDC2
D302 EQU PACTL   D300 EQU PORTA
 224 EQU VVBLKD   212 EQU VTIMR2
 600 EQU SERVO0   601 EQU SERVO1
 602 EQU SERVO2   603 EQU SERVO3
 604 EQU SERVO4   605 EQU SERVO5
 606 EQU SERVO6   607 EQU SERVO7
 608 EQU OPULS0   609 EQU OPULS1
 60A EQU OPULS2   60B EQU OPULS3
 60C EQU OPULS4   60D EQU OPULS5
 60E EQU OPULS6   60F EQU OPULS7
                                -->

Screen: 51
( PAGE 6 CODE )

0 VARIABLE 6CODE -2 ALLOT
2020 , 2020 , 2020 , 2020 ,
DECIMAL ( OPULS0-7 VALUES: )
64 C, 64 C, 64 C, 64 C,
64 C, 64 C, 64 C, 64 C, HEX
0000 , 11AD , 8D06 , D300 ,
110E , AE06 , 0610 , 08E0 ,
10F0 , BD18 , 0600 , 087D ,
8D06 , D202 , 098D , EED2 ,
0610 , A260 , 8E00 , 0610 ,
088E , 8ED2 , D400 , 8EE8 ,
0611 , 10A5 , 0209 , 0E8D ,
20D2 , 0612 , 624C , 8AE4 ,
2048 , 0612 , AA68 , 4068 ,   -->

Screen: 52
( SETUP START STOP )
: SETUP ( -- )
6CODE 600 58 CMOVE
PACTL C@ DUP FB AND PACTL C!
FF PORTA C! PACTL C!
A0 AUDC2 C! 64F VTIMR2 ! ;

SETUP

: START ( -- )
```

continued on next page

IMPORTANT NOTICE:

In case you didn't notice, Antic did **NOT** publish a **MAY** issue!

We didn't skip an issue, we just moved up our cover date to facilitate distribution.

This change will not affect your subscription, or the number of issues published in 1984. There will be 12 issues in this volume. Subscriptions will be adjusted automatically, and you can expect to receive each issue at least two weeks before its cover date.

```
   C2 POKMSK C!  Ø D4ØE C!
   633 VVBLKD ! 4Ø D4ØE C! ;

: STOP ( -- )
    Ø D4ØE C! E462 VVBLKD !
   4Ø D4ØE C! CØ POKMSK C! ;   -->

Screen: 53
 ( TEST )

 DECIMAL

: TEST ( -- )
   START 1Ø Ø
   DO 8 Ø
     DO SERVOØ I + C@ DUP 2Ø +
       SERVOØ I + C! 6ØØØ Ø DO LOOP
       SERVOØ I + C! 6ØØØ Ø DO LOOP
     LOOP
     ?TERMINAL IF LEAVE ENDIF
   LOOP STOP ;
```

TALK TO THE STARS

The world of shortwave radio & computer communications

by JACK McKIRGAN II

How does taking a crack at decoding secret CIA or KGB messages appeal to you? Or perhaps — less exciting, but safer — receiving bulletins from news services around the world?

You can do both, and more, with radio communications. By hooking up your Atari to a short-wave or ham-radio receiver, you can become part of an exciting way of communicating with the outside world. You can, in fact, accomplish just what you could with a telephone and modem, but without making payments to Ma Bell, her offspring or her clones!

The first thing you need to get started is a good short-wave or ham-radio receiver. Good doesn't necessarily mean expensive, although some can cost several thousand dollars. The new digitally-controlled, short-wave radios offer high quality performance: They are sensitive, relatively inexpensive, and have stable receivers. Even better, anyone who can turn on a stereo can use one.

Next, get an antenna. This can be as simple as a piece of wire running along a wall or as complex as the equipment at a military installation.

A radio modem, also known as a Terminal Unit (TU), converts the signals from your radio's speakers into pulses that feed into your Atari personal computer (PC). (See the review of Macrotronics' RM-1000 Radio Modem in this issue.) Ham radio operators have developed many programs that will work with your Atari if you use the RS-232 port of an Atari 850 or similar interface to connect your computer and a radio modem. Some of these programs even allow you to set up an on-the-air bulletin board, provided that you have a license to transmit.

The Federal Communications Commission (FCC) set up the Amateur Radio Service so that amateur radio users could apply and test for a license to transmit voice, code and digital communications over the radio waves. Specific privileges vary with the type of license granted. But once you acquire a license to transmit, a new neighborhood opens up to you — the entire planet! Amateur radio even has its own series of satellites for use by the worldwide community of "hams."

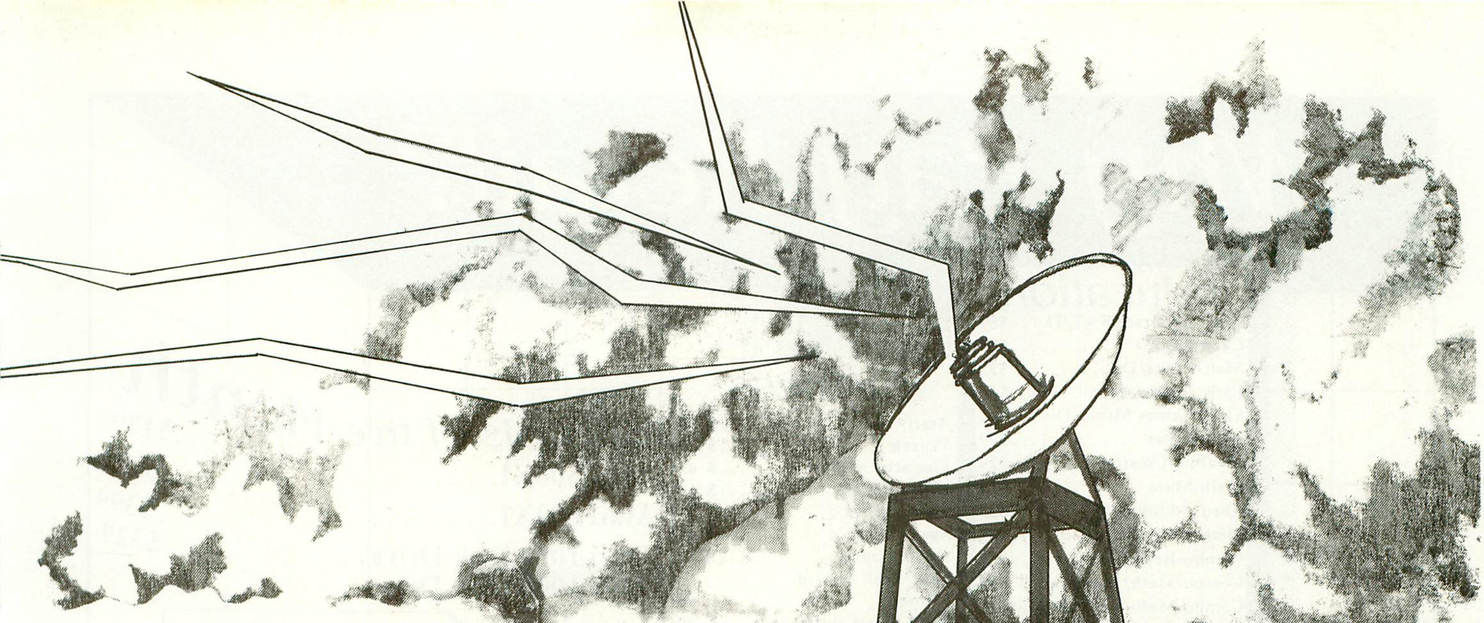
Without a license, however, you are not allowed to transmit messages, or to make digital or code transmissions on Citizens Band radio.

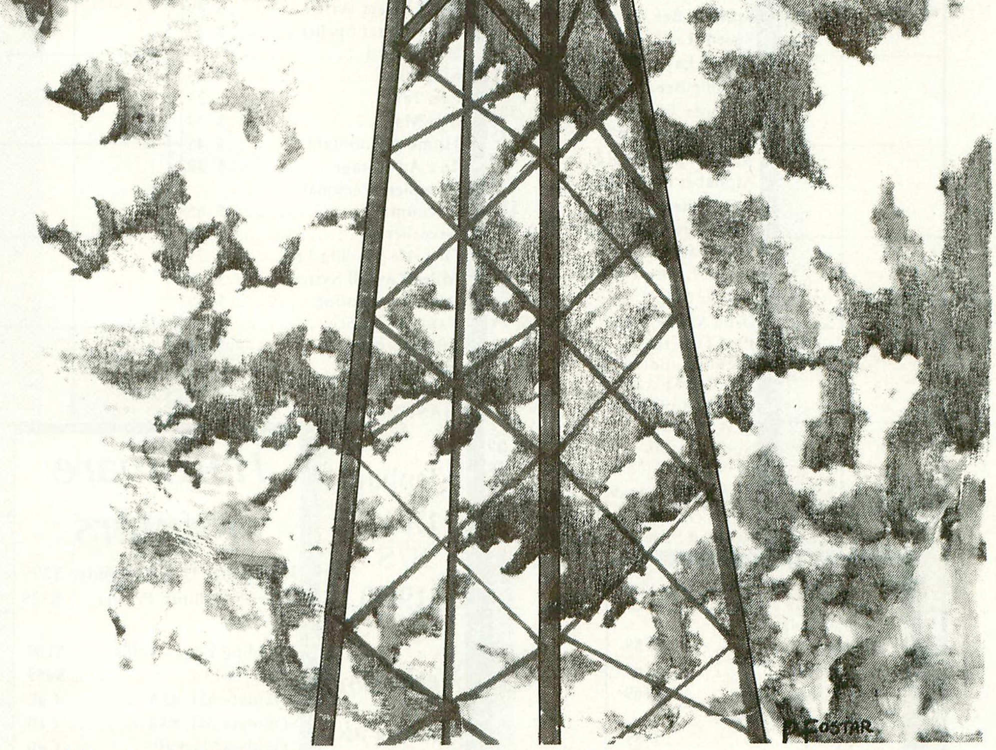
Even if you can't transmit your own messages, you can garner a tremendous amount of information just by listening — in fact, that's how I became a ham radio operator. Once you gain access to the airwaves, however, you can retrieve even more information. You can "hear" (via the words that appear on your monitor) radio operators chatting about equipment and see the pictures they transmit (these can then be printed on your printer). You also can receive news bulletins from the far ends of the Earth that you'll never see in your local newspaper. And, yes, covert and overt agents all over the world do send coded secrets to other agents and to their superiors. Test your programming skill by trying to decode these secret messages. Who knows — you may have a future with the CIA. . . .

A WEALTH OF OPTIONS

There are several useful modes of radio communication, including Morse Code, radioteletype, and ASCII. With a radio modem and accompanying software, you can choose the mode in which you want to receive and transmit messages. Type in your message, and the software does the rest. Differences exist among these modes, however, and the government places some limitations on their use. Let's take a look at each of them:

- Morse Code — One of the first "digital" codes, this internationally accepted code consists of a series of long and short beeps that form each letter of the alphabet. Invented long before computers, Morse Code presents some problems when used with them, because the varying length of each character makes software design difficult. As a result, most of the Morse Code now being sent is sent by hand, not machine. The software used in this application must be able to analyze human-caused variations in the code to translate it properly, and this causes problems. Radio operators call this mode CW, for continuous wave.
- Radioteletype — This mode of communication uses a five-bit code with a unique feature: most of its characters have two meanings. A control code is used to toggle between the two character sets. This code was developed for use with electro-mechanical "Teletype" machines, and is currently the most commonly used non-telephone mode of computer communication. Radio operators have nicknamed it RTTY (pronounced Ritty).
- ASCII — The "native son" of inter-computer communications, ASCII was





recently approved for radio communications by non-commercial and non-governmental services. This mode allows an extensive set of characters to be sent, some of which can be non-standard. This can be quite useful to Atari PC users because of the Atari's special control and graphics characters. ASCII is slowly becoming more popular as a communications mode for radio operators, but it will take time for its popularity to become widespread. Many organizations and amateurs are diehard RTTY users.

The following list of organizations and manufacturers may help you get started in the world of radio communications. By the way, the Atari Microcomputer Network, a users' group with more than 800 members, meets on an almost weekly basis, and the participants don't even have to leave the comfort of their homes. We communicate by radio, of course!

- Universal Amateur Radio
  4555 Groves Road, Suite 3
  Columbus, OH 43227

This group publishes a comprehensive list of radioteletype stations that includes the times and frequencies for each service.

- American Radio Relay League (ARRL)
  225 Main St.
  Newington, CT 06111

A national organization of amateur radio operators, ARRL publishes QST, a general information magazine, and dozens of specialized books on digital and code communications.

- The Atari Microcomputer Network Amateur Radio Operators Users' Group
  4749 S.R. 207 N.E.
  Washington C.H., OH 43160
  (614) 869-3597

An on-the-air users' group of amateur radio operators and short-wave listeners, the Atari Microcomputer Network publishes *Ad Astra . . .* , a journal composed of member-written hardware articles and programs.

- Trio-Kenwood Communications
  1111 West Walnut
  Compton, CA 90220

A manufacturer of amateur and short-wave radio equipment.

- Macrotronics, Inc.
  1125 N. Golden State Blvd., Suite G
  Turlock, CA 95380
  (209) 667-2888

A manufacturer of hardware and software that allows Atari computers to be operated as RTTY, ASCII or CW terminals.

- Yaesu Electronics Corp.
  6851 Walthall Way
  Paramount, CA 90723
  (213) 633-4007

A manufacturer of amateur and short-wave radio equipment.

Jack McKirgan II (WD8BNG) is the national net coordinator for the Atari Microcomputer Network.

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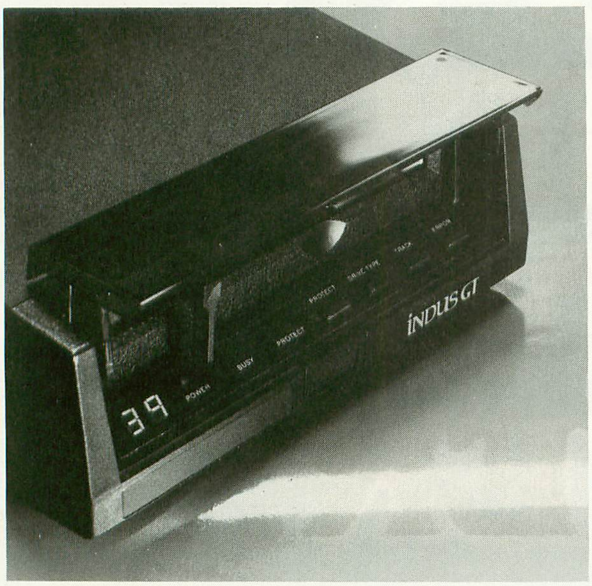
	ATARI 800XL	//e	IBM PC
Computer w/64K and 2 Disk Drives	1297	2445	2633
Monitor with Interface and Cable	121	incl	680
Printer Interface and Cable	134	120	205
Printer	449	449	595
TOTAL HARDWARE	**1991**	**3014**	**4113**
General Ledger	145	395	595
Accounts Receivable	145	395	595
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TOTAL SOFTWARE	**435**	**1590**	**2380**
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Reach track 39 in *less than one second*. Increase your Atari's transfer rate *400 percent* using the exclusive Indus SychroMesh DataTransfer™ mode. Compare that to others' drives.



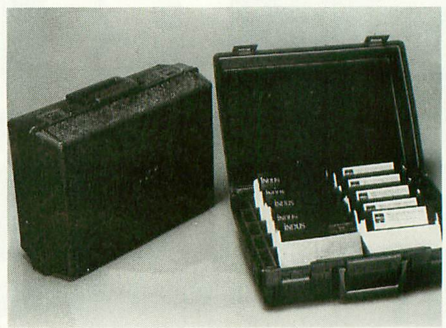
And while you're comparing, consider the built-in software that comes with every Indus GT: A comprehensive word processing package, an electronic spreadsheet, and a data base manager.

That adds up to formidable Atari performance at about *half the price of an Apple*; hardly a "games" machine!

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Innovations in convenience abound. Automatic display of head-positioning; LED-lit *Busy* and *Protect* lights, and a two-digit LED register, only scratch the surface. And *every* Indus GT includes a rugged, molded PortaCase™ that doubles as an 80 disk library.



The Indus GT is also the *perfect* storage peripheral to power the incomparable, Miles Accounting System II.

Please send me information on Indus GT disk drives and the Miles Accounting System II business software.

YOUR NAME ____________________

COMPANY ____________________

ADDRESS ____________________

CITY ________ STATE ________ ZIP ________

YES NO

☐ ☐ I currently own an Atari. Model #______

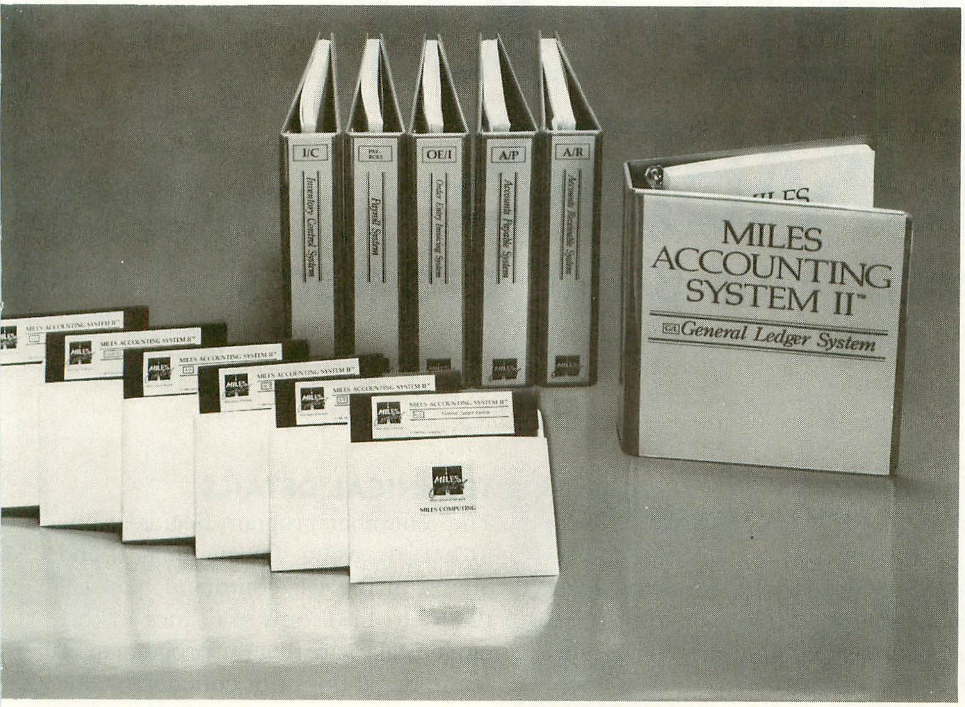
☐ ☐ I currently own a disk drive. Brand: ______

☐ ☐ I currently own Miles Accounting System II modules. They are: ______

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User support is guaranteed because Miles Computing is a company that *cares* about its customers. That is evidenced by their willingness to show you before you buy. With that in mind, drop by your local computer store and see our self-running demonstration of the Miles Accounting System II.

The Finest Accounting System available for the Atari today.

The critics agree. Miles Accounting System II is not only the finest accounting system available for the Atari today, but it rivals any system available for other personal computers. And it's the other half of the astonishing new Atari business power package.

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InfoWorld Report Card

Miles Payroll System

	Poor	Fair	Good	Excellent
Performance	☐	☐	☐	☑
Documentation	☐	☐	☐	☑
Ease of Use	☐	☐	☐	☑
Error Handling	☐	☐	☐	☑

"In all respects—features, performance, ease of use, documentation and support—this is a professionally conceived and executed program. We look forward to other business software from Miles Computing that will serve the needs of Atari owners."

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Van Nuys, CA 91406
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If you act quickly, you can select any three Miles Accounting System II modules, and get a fourth of your choice **absolutely FREE**.

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SPACED OUT NUMBERS

Get even with your BASIC programs

by JERRY WHITE and FERNANDO HERRERA

SYNOPSIS

RENUMBER is a utility routine that renumbers any BASIC program. It runs on all Atari computers, and requires 16K RAM and BASIC.

This month's utility is a subroutine that changes line numbers and references to line numbers in Atari BASIC programs. It is written entirely in Atari BASIC.

The subroutine and the program to be renumbered share your computer's RAM. After you type in the program, store it on tape using the command LIST"C:" [RETURN] or on disk with LIST"D:RENUMBER.LST" [RETURN].

To use this program, you must first place the program to be renumbered in RAM, and then ENTER the renumber program from tape or disk. With both programs in memory, press [RESET]. Then use the immediate mode command GOTO 31000 [RETURN].

RENUMBER asks you for a new starting line number and line-increment amount. For example, if you want your program to begin at line 100 and increment each line number by 10, respond with 100 [RETURN] to the first prompt and 10 [RETURN] to the second.

To speed execution, the screen is turned off during the renumbering process. When renumbering is complete, or if an error occurs, the screen is turned back on again.

Test your renumbered program before storing it back onto tape or disk. Store it using the LIST command — if you use SAVE or CSAVE, you'll store both your program and the renumber utility. To store your renumbered program on tape, use the command LIST"C:",0,30999 [RETURN]. To store on disk, use the command LIST"D:FILENAME.EXT",0,30999 [RETURN].

If you want to store a tokenized or SAVEd version of your renumbered program, you must next erase the program in memory by using the immediate-mode command NEW [RETURN]. Use ENTER to bring your renumbered program back into RAM. Then simply CSAVE or SAVE your program onto tape or disk.

TECHNICAL DETAILS

The renumber program begins at line 31000. By using line numbers 0 and 30999 in the list command, you tell BASIC to LIST only the lines in that range. Make sure that the program to be renumbered does not contain any line numbers greater than 30999. This maximum line number also applies to your renumbered program, so keep it in mind when you enter your starting line number and increment.

It must be possible for your program and the renumbering program to coexist in your computer's memory. Note that the renumbering program requires 4,478 bytes of RAM and uses 22 variables. Since Atari BASIC permits a maximum of 128 variables, your program cannot use more than 106 unique variable names.

This utility program changes all line number references in commands such as TRAP, GOTO, GOSUB, and RESTORE. When a variable is used to indicate a line number, this program changes only the first occurrence of that variable. The example below shows a short program before and after renumbering. If these sample programs were to be run, the first version would display the numbers 30 and 0. The second version (after renumbering) would display the numbers 130 and 0. To avoid problems when variables are used as line number references, assign only one value and avoid the use of expressions.

Before Renumbering	After Renumbering
10 J=30	100 J=130
15 GOSUB J	110 GOSUB J
20 GOTO 50	120 GOTO 150
30 PRINT J	130 PRINT J
40 RETURN	140 RETURN
50 J=0	150 J=0
60 GOSUB 30	160 GOSUB 1304

continued on next page

When the evaluation of an arithmetic or logical expression is used to represent a line number, the expression remains unchanged, but its existence is indicated in an error screen listing. Copy any error messages onto paper, and then make any necessary corrections to your program.

ERROR MESSAGES

The message "LINE NOT FOUND" means that your program has an unreferenced line number. Unless this refers to a TRAP reset command, such as TRAP 40000, this indicates that there's a bug in your program.

The message "VARIABLE NOT DEFINED" means that there is a variable in the variable table that isn't used in your program. This is not a fatal error, and it can be ignored. To get rid of unused variables, store your program using the LIST command, enter a NEW command, reload your program with the ENTER command, and then store your program back on tape or disk using the CSAVE or SAVE command.

The message "LOGIC OR ARITHMETIC EXPRESSION" is used to flag each occurrence of unchanged expressions. You'll have to change these expressions manually to ensure that your renumbered program runs properly.

In future issues of **Antic**, we'll provide other useful utility subroutines and programs like this one. These routines must often coexist with one of your BASIC programs. In an effort to avoid potential conflicts, we'll use line numbers that are greater than 30000 whenever possible. Keep your line numbers below 30000, and your programs can coexist with our utilities.

If you have any questions on how to do something in Atari BASIC, or requests for utility programs, please send them to Jerry White c/o **Antic**, 524 Second Street, San Francisco, CA 94107.

Jerry White is an institution in the world of Atari computing, and a long-time ***Antic*** *Contributing Editor. Fernando Herrera won the first APX (Atari Program Exchange) Star software award in 1981 for My First Alphabet. That award suggested a name for the software publishing firm he founded, First Star Software, a company with which he is still associated.*

```
31000 REM RENUMBERING UTILITY
31002 REM BY JERRY WHITE
31004 REM AND FERNANDO HERRERA
31006 REM ANTIC MAGAZINE
31010 GOTO 31560
31020 FOR I=0 TO 5:B(I)=PEEK(A+I):NEXT I:IF B(0)=0 THEN D=0:GOTO 31050
31030 FOR I=1 TO 5:C$(I*2-1,I*2-1)=STR$(INT(B(I)/16)):C$(I*2,I*2)=STR$(B(I)-INT(B(I)/16)*16):NEXT I
31040 D=INT(VAL(C$)/INT(100^(68-B(0))))
31050 H=INT(D/256):L=D-H*256:FOR I=1 TO J*2 STEP 2
31060 IF L=ASC(A$(I,I)) AND H=ASC(A$(I+1,I+1)) THEN L=ASC(B$(I,I)):H=ASC(B$(I+1,I+1)):POP :GOTO 31080
31070 NEXT I:GOSUB 31710:GOSUB 31540:? "L.";D;" NOT FOUND":RETURN
31080 D=L+H*256:IF D=0 THEN 31120
31090 C$="0000000000":L=LEN(STR$(D)):IF L/2=INT(L/2) THEN C$(1,L)=STR$(D):GOTO 31110
31100 C$(2,L+1)=STR$(D)
31110 FOR I=1 TO 9 STEP 2:K=VAL(C$(I,I+1)):B(INT(I/2+1))=INT(K/10)*16+K-INT(K/10)*10:NEXT I:B(0)=63+INT((L+1)/2)
31120 FOR I=0 TO 5:POKE (A+I),B(I):NEXT I:RETURN
31130 FOR I=1 TO 128:IF V$(I,I)=CHR$(X) THEN POP :RETURN
31140 NEXT I:V$(X-127,X-127)=CHR$(X):Y=R:L=0
31150 L=L+1:IF L>J THEN GOSUB 31710:GOSUB 31540:? "VAR. NOT DEFINED":RETURN
31160 I=Y+3
31170 IF (PEEK(I+1)=54 OR PEEK(I+1)=6) AND PEEK(I+2)=X AND PEEK(I+4)=14 THEN 31200
31180 IF PEEK(Y+2)<>PEEK(I) THEN I=Y+PEEK(I):GOTO 31170
31190 Y=Y+PEEK(Y+2):GOTO 31150
31200 IF PEEK(I+11)=20 OR PEEK(I+11)=22 THEN A=I+5:GOSUB 31020:RETURN
31210 GOTO 31180
31220 IF M<>Z THEN RETURN
31230 A=P+M-7:GOSUB 31020:RETURN
31240 T=S+3
31250 IF PEEK(T)=23 OR PEEK(T)=24 THEN T=T+1:GOTO 31270
31260 T=T+1:GOTO 31250
31270 IF PEEK(T)=14 AND (PEEK(T+7)=18 OR PEEK(T+7)=22 OR PEEK(T+7)=20) THEN GOTO 31330
31280 IF PEEK(T)>127 AND (PEEK(T+1)=18 OR PEEK(T+1)=22 OR PEEK(T+1)=20) THEN 31350
31290 GOSUB 31710:GOSUB 31540:? "LOG. OR ARIT. EXP"
31300 T=T+1:IF PEEK(T)=18 THEN T=T+1:G
```

```
OTO 31270
31310 IF PEEK(T)=22 OR PEEK(T)=20 THEN RETURN
31320 GOTO 31300
31330 A=T+1:GOSUB 31020:IF PEEK(T+7)=18 THEN T=T+8:GOTO 31270
31340 RETURN
31350 X=PEEK(T):GOSUB 31130:IF PEEK(T+1)=18 THEN T=T+2:GOTO 31270
31360 RETURN
31370 T=S+2:IF PEEK(T)=22 OR PEEK(T)=20 THEN RETURN
31380 IF PEEK(T)=15 AND (PEEK(T+PEEK(T+1)+2)=22 OR PEEK(T+PEEK(T+1)+2)=20) THEN RETURN
31390 IF PEEK(T)=15 THEN T=T+PEEK(T+1)+3
31400 GOSUB 31270:RETURN
31410 Q=Q+1:IF Q>J THEN 31500
31420 M=PEEK(P+2):S=P+3
31430 Z=PEEK(S):N=PEEK(S+1)
31440 IF N=10 OR N=11 OR N=12 OR N=13 THEN T=S+2:GOSUB 31270:GOTO 31480
31450 IF N=7 THEN GOSUB 31220:GOTO 31480
31460 IF N=30 THEN GOSUB 31240:GOTO 31480
31470 IF N=4 OR N=35 THEN GOSUB 31370
31480 IF M<>Z THEN S=P+Z:GOTO 31430
31490 P=P+M:GOTO 31410
31500 GOSUB 31690:IF PEEK(84)<5 THEN POKE 764,43:GOTO 31520
31510 ? " WRITE DOWN THESE NOTES TO FIX YOUR    PROGRAM AND THEN TYPE 'Y' TO LIST IT "
31520 IF PEEK(764)<>43 THEN 31520
31530 ? :? " REVIEW AND TEST YOUR PROGRAM ":? " BEFORE SAVING IT ":POKE 764,255:END
31540 H=ASC(A$(Q*2,Q*2)):L=ASC(A$(Q*2-1,Q*2-1)):K=ASC(B$(Q*2,Q*2))
31550 I=ASC(B$(Q*2-1,Q*2-1)):? L+H*256,I+K*256,:RETURN
31560 CLR :TRAP 31560:? CHR$(125):? :? "NEW STARTING LINE";
31570 INPUT T:IF T<0 OR T>30999 OR T<>INT(T) THEN 31560
31580 ? "LINE INCREMENT";:INPUT S:IF S<1 OR S<>INT(S) THEN 31560
31590 TRAP 31700:GOSUB 31680:R=PEEK(136)+PEEK(137)*256:P=R:J=0:Q=J
31600 D=PEEK(P)+PEEK(P+1)*256:IF D=31000 THEN GOTO 31620
31610 J=J+1:P=P+PEEK(P+2):GOTO 31600
31620 IF T+S*J>30999 THEN GOSUB 31690:? "INCREMENT TOO BIG"
31630 IF PEEK(540) THEN 31630
31640 DIM C$(10),B(6),V$(128),A$(J*2),B$(J*2):FOR I=1 TO 128:V$(I,I)=CHR$(0):NEXT I:P=R:FOR I=1 TO J*2 STEP 2
31650 H=INT(T/256):L=T-H*256:A$(I)=CHR$(PEEK(P)):POKE P,L:B$(I)=CHR$(L):A$(I+1)=CHR$(PEEK(P+1)):POKE P+1,H
31660 B$(I+1)=CHR$(H):T=T+S:P=P+PEEK(P+2):NEXT I:? CHR$(125);" BASIC RENUMBERING PROGRAM "
31670 ? "OLD LINE","NEW LINE","NOTES":? "--------","--------","-----":P=R:GOTO 31410
31680 POKE 559,0:RETURN
31690 POKE 559,34:RETURN
31700 GOSUB 31690:? "ERROR ";PEEK(195);" LINE # ";PEEK(186)+PEEK(187)*256:END
31710 IF PEEK(84)<20 THEN RETURN
31720 GOSUB 31690:? " WRITE DOWN THE ABOVE NOTES ":? "THEN TYPE 'G' TO CONTINUE":POKE 764,255
31730 IF PEEK(764)=61 THEN ? CHR$(125):GOSUB 31680:RETURN
31740 GOTO 31730
```

TYPO TABLE

Variable checksum = 209506

Line num range	Code	Length
31000 – 31060	LN	547
31070 – 31140	MR	521
31150 – 31260	PI	483
31270 – 31370	DQ	535
31380 – 31490	IH	478
31500 – 31560	NL	506
31570 – 31650	LB	613
31660 – 31740	FJ	490

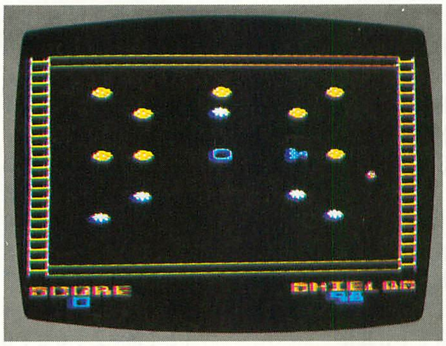


STARSECTOR DEFENSE

by JOHN WILSON

Stardate 2306.7
Captain's Log . . .
Received an urgent message from Comstar that the Nebulus, our sister ship, has been reported lost in an uncharted sector of space. We have been assigned to investigate and assist in rescue operations. End of Captain's Log . . .

You are in command of the battle cruiser Centurion. Your mission — to rescue any remaining members of the crew of the Nebulus. Use a joystick plugged into Port 1 to control your vessel. Push the stick to the right or left to rotate the ship, and push it forward to move in the direction you're facing. Forward thrust continues until you release the joystick, at which point your ship decelerates until it stops. If you pull back on the stick, reverse thrusters act as brakes. As an emergency measure, you can hyperwarp through space by moving into the screen's border. If you do this, though, you'll lose 40 percent of your current energy.



SYNOPSIS

This arcade-style action game requires BASIC and a minimum of 16K RAM (24K with DOS). It runs on all Atari computers.

CONVERT MOVEMENT INTO ENERGY

Your ship uses the latest in ion-energy-conversion technology. As it hurtles through space, it scoops up ions and converts them into energy. Therefore, in order to maintain your energy reserves, you must keep moving. If you let your energy level hit zero, your shields will disappear and you'll be defenseless. If you're hit by enemy fire during this period, you'll be destroyed.

Your enemies are members of a mechanical race built eons ago to protect this sector of space. Their saucers are equipped with powerful lasers that drain your shields in proportion to the saucers' distance from your ship. And if an alien ship picks up one of the surviving members of the Nebulus' crew, you are penalized five points.

continued on next page

In self defense, your ship is armed with plasma torpedoes, which you fire with the joystick trigger. You can fire up to two at a time, and you get 10 points for each ship you destroy.

OTHER DANGERS AND AN ESCAPE ROUTE

If you hit one of the stars strewn about the sector, your ship will be destroyed; if you hit an asteroid, you'll lose 30 percent of your energy. Don't lose hope, however. You can always use the black hole at the screen's center to transport yourself at random to another part of the sector. Since you're using the black hole's gravitational force, no energy is consumed, but there's always the risk of emerging on top of a sun or an asteroid! The game ends when your ship is destroyed.

You can stop the game during play by pressing any key. To resume play, simply move the joystick. Good luck, Commander.

John Wilson, 27, is a self-taught BASIC and assembly-language programmer, and has been writing game programs for about four years. He works as an electronics technician for Ford Motor Company.

```
5 REM STARSECTOR DEFENSE
6 REM BY JOHN WILSON
7 REM ANTIC MAGAZINE
10 Z=0:X=Z:DIM SHIP(8),LS(8),AL(4),MOVF(8),RUBLE(6),EKP(6),PS(6):HSC=Z:SCORE=Z:GOTO 1120
20 IF STMV THEN THRUST=10:THRDIR=Z:POP:GOTO 350
30 SHLD=INT(SHLD*0.6)
40 FOR X=250 TO 80 STEP -3:SOUND 2,X,8,6:SOUND 3,X+2,8,6:SETCOLOR 4,Z,RND(Z)*15:NEXT X
50 FOR X=70 TO 250 STEP 2:SOUND 2,X,8,6:SOUND 3,X-2,8,6:SETCOLOR 4,0,RND(Z)*15:NEXT X
60 SOUND 2,Z,Z,Z:SOUND 3,Z,Z,Z:SETCOLOR 4,Z,Z:RETURN
70 GOSUB 20:IF THRDIR<4 THEN SHPLOC=SHPLOC-17:RETURN
80 SHPLOC=SHPLOC+17:RETURN
90 GOSUB 20:IF THRDIR>2 THEN IF THRDIR<6 THEN SHPLOC=SHPLOC-360:RETURN
100 SHPLOC=SHPLOC+360:RETURN
110 SETCOLOR 4,Z,14:POKE SHLDDMG,INIT:SHLD=INT(SHLD*0.7):SHPLOC=SHPLOC+MOVF(THRDIR)
120 SETCOLOR 4,Z,Z:RETURN
130 SHPLOC=SHPLOC+7*MOVF(INT(RND(Z)*8)+1):IF PEEK(SHPLOC)<>Z THEN 130
140 FOR X=200 TO 75 STEP -1:SOUND 2,X,8,10:NEXT X:SOUND 2,Z,Z,Z:RETURN
150 FOR X=255 TO 140 STEP -15:SOUND 3,X,10,10:NEXT X:SOUND 3,Z,Z,Z:RETURN
160 SHLD=SHLD-1:IF SHLD<Z THEN SHLD=Z
170 POSITION 15,23:? #6;SHLD;" ":RETURN
180 IF MANC<5 THEN IF RND(Z)>0.8 THEN GOSUB 980
190 IF PEEK(764)<>255 THEN GOSUB PAUSE
200 IF STRIG(Z) THEN 230
210 POKE 77,Z:IF F1 THEN F1=Z:GOSUB 150:M1=MOVF(ROTATE):MM1=M1+M1:T1=SHPLOC:GOTO 370
220 IF F2 THEN IF TP1LIM>2 THEN F2=Z:GOSUB 150:M2=MOVF(ROTATE):MM2=M2+M2:T2=SHPLOC:GOTO 410
230 GOSUB 160:P=STICK(Z):THRUST=THRUST+1:IF THRUST>9 OR P=13 OR P=9 OR P=5 THEN THRDIR=Z
240 STMV=1:IF P=14 THEN THRDIR=ROTATE:THRUST=Z:STMV=Z
250 IF P=7 THEN ROTATE=ROTATE+1:IF ROTATE>8 THEN ROTATE=1
260 IF P=11 THEN ROTATE=ROTATE-1:IF ROTATE<1 THEN ROTATE=8
270 POKE SHPLOC,Z:SHPLOC=SHPLOC+MOVF(THRDIR):P=PEEK(SHPLOC):IF P=Z THEN 340
280 IF P=MAN THEN SCORE=SCORE+30:SOUND 2,100,10,10:GOSUB 820:SOUND 2,Z,Z,Z:MANC=MANC-1:GOTO 340
290 SHPLOC=SHPLOC-MOVF(THRDIR):IF P=VERTB THEN GOSUB 70:GOTO 340
300 IF P=HORB THEN GOSUB 90:GOTO 340
310 IF P=BH THEN GOSUB 130
320 IF P=STAR THEN E=SHPLOC:GOSUB 900:GOTO 1030
330 IF P=ASTER THEN GOSUB 110:IF SHLD=Z THEN E=SHPLOC:GOSUB 900:GOTO 1030
340 IF THRDIR THEN SHLD=SHLD+2
350 POKE SHPLOC,SHIP(ROTATE):IF F1 THEN FOR X=1 TO 4:NEXT X:GOTO 390
360 POKE T1,Z:IF TP1LIM>6 THEN F1=1:TP1LIM=Z:GOTO 390
370 T1=T1+MM1:P=PEEK(T1):PP=PEEK(T1-M1):IF P OR PP THEN L1=T1:L2=T1-M1:GOSUB 800:F1=1:TP1LIM=Z:GOTO 390
380 POKE T1,224:TP1LIM=TP1LIM+1
390 IF F2 THEN FOR X=1 TO 4:NEXT X:GOTO 430
400 POKE T2,Z:IF TP2LIM>6 THEN F2=1:TP2LIM=Z:GOTO 430
410 T2=T2+MM2:P=PEEK(T2):PP=PEEK(T2-M2):IF P OR PP THEN L1=T2:L2=T2-M2:GOSUB 800:F2=1:TP2LIM=Z:GOTO 430
```

continued on page 73


Flight Simulator II
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STARSECTOR DEFENSE continued from page 70

```
420 POKE T2,224:TP2LIM=TP2LIM+1
430 YT=YT+1:IF YT<2 THEN 180
440 YT=Z:NU=NU+1:IF NU>NA THEN NU=1
450 IF PEEK(AL(NU))<>ALIEN THEN GOSUB
770
460 FIRE=Z:POKE AL(NU),Z:XX=(AL(NU)-C)
/20:XY=(SHPLOC-C)/20
470 ROW=INT(XX)-INT(XY):COLM=((XX-INT(
XX))-(XY-INT(XY)))*20
480 IF ROW>Z THEN 520
490 IF ROW<Z THEN 550
500 IF COLM>Z THEN D=6:GOTO 600
510 D=2:GOTO 600
520 IF COLM>Z THEN D=7:GOTO 620
530 IF COLM<Z THEN D=1:GOTO 620
540 D=8:GOTO 580
550 IF COLM>Z THEN D=5:GOTO 620
560 IF COLM<Z THEN D=3:GOTO 620
570 D=4
580 IF ABS(ROW)<8 THEN FIRE=1
590 GOTO 630
600 IF ABS(COLM)<8 THEN FIRE=1
610 GOTO 630
620 IF ABS(ROW)=ABS(COLM) THEN IF ABS(
ROW)<8 THEN FIRE=1
630 AL(NU)=AL(NU)+MOVF(D):P=PEEK(AL(NU
)):IF P THEN 740
640 POKE AL(NU),ALIEN:IF FIRE THEN X=A
L(NU)+MOVF(D):II=Z:SOUND Z,75,8,8:GOTO
 670
650 GOTO 180
660 POKE X,0:X=X+MOVF(D):IF II>5 THEN
SOUND Z,Z,Z,Z:GOTO 180
670 P=PEEK(X):IF P=Z THEN POKE X,LS(D)
:II=II+1:GOTO 660
680 SOUND Z,Z,Z,Z:IF P=224 THEN II=II+
1:GOTO 660
690 IF P=60 THEN X=X+5*MOVF(INT(RND(0)
*8)+1):GOTO 670
700 SOUND Z,Z,Z,Z:IF P>8 THEN 180
710 FOR X=200 TO 80 STEP -20:POKE SHPL
OC-MOVF(D),201+RND(0)*8:SOUND Z,X,8,8:
NEXT X:SOUND Z,Z,Z,Z
720 POKE SHPLOC-MOVF(D),Z:SHLD=SHLD-(1
0-II):GOSUB 160:IF SHLD<1 THEN E=SHPLO
C:POKE SHPLOC,Z:GOSUB 900:GOTO 1030
730 GOTO 180
740 IF P=BH THEN 860
750 IF P=MAN THEN SOUND 2,255,10,10:SC
ORE=SCORE-5:GOSUB 820:MANC=MANC-1:SOUN
D 2,Z,Z,Z:GOTO 640
760 AL(NU)=AL(NU)-MOVF(D):D=INT(RND(Z)
*8)+1:FIRE=Z:GOTO 630
770 AL(NU)=C+22+INT(RND(Z)*18)*20+INT(
RND(Z)*18)
780 IF PEEK(AL(NU)) THEN 770
790 FOR X=9 TO 14:POKE AL(NU),128+X:SO
UND 3,100-X*3,12,8:NEXT X:POKE AL(NU),
ALIEN:SOUND 3,Z,Z,Z:RETURN
800 IF PP=ALIEN THEN I=L2:GOSUB 850:GO
TO 820
810 IF P=ALIEN THEN I=L1:GOSUB 850
820 IF SCORE<Z THEN SCORE=Z
830 POSITION 2,23:? #6;SCORE:IF SCORE>
500 AND INCFLG=Z THEN NA=4:INCFLG=1:AL
(4)=CE
840 RETURN
850 SCORE=SCORE+10:FOR X=9 TO 14:POKE
I,192+X:SOUND 3,100+X*5,10,6:NEXT X:PO
KE I,Z:SOUND 3,Z,Z,Z:RETURN
860 AL(NU)=C+22+INT(RND(Z)*15)*20+INT(
RND(Z)*15)
870 IF PEEK(AL(NU))=Z THEN POKE AL(NU)
,ALIEN:FIRE=Z:GOTO 180
880 GOTO 860
890 REM EXPLOSION ROUTINE
900 SOUND 3,250,8,14:FOR X=1 TO 5:EXFL
AG=1:FOR Y=1 TO 6:RUBLE(Y)=INT(7*RND(Z
))+201:EKP(Y)=RUBLE(Y):NEXT Y
910 EX1=E+X:EX2=E-X:EX3=E-20*X:EX4=E+2
0*X:EX5=E+20*X-X:EX6=E-20*X+X
920 PS(1)=PEEK(EX1):PS(2)=PEEK(EX2):PS
(3)=PEEK(EX3):PS(4)=PEEK(EX4):PS(5)=PE
EK(EX5):PS(6)=PEEK(EX6)
930 POKE EX2,EKP(2):POKE EX1,EKP(1):PO
KE EX4,EKP(4):POKE EX5,EKP(5)
940 IF EX3>C THEN POKE EX3,EKP(3)
950 IF EX6>C THEN POKE EX6,EKP(6)
960 IF EXFLAG THEN FOR Y=1 TO 6:EKP(Y)
=PS(Y):NEXT Y:EXFLAG=Z:GOTO 930
970 NEXT X:SOUND 3,Z,Z,Z:FOR X=1 TO 20
0:NEXT X:F1=1:F2=1:RETURN
980 MANC=MANC+1
990 X=C+22+INT(RND(Z)*18)*20+INT(RND(Z
)*18):IF PEEK(X)<>Z THEN 990
1000 POKE X,MAN:RETURN
1010 POKE 764,255:IF STICK(Z)<>15 THEN
 SOUND 2,Z,Z,Z:SOUND 3,Z,Z,Z:RETURN
1020 SOUND 2,150,10,2:SOUND 3,152,10,2
:GOTO 1010
1030 GRAPHICS 17:POKE 756,BASE:POSITIO
N 5,2:? #6;"GAME  OVER":POSITION 2,6:?
 #6;"LAST PILOTS SCORE"
1040 X=10-LEN(STR$(SCORE))/2
1050 POSITION X,8:? #6;SCORE:POSITION
5,13:? #6;"high score"
1060 IF SCORE>HSC THEN HSC=SCORE
1070 X=10-LEN(STR$(HSC))/2:POSITION X,
15:? #6;HSC
1080 POSITION 4,21:? #6;"            "
```

continued on page 75

What is a TYPO TABLE?

If you're new to ANTIC, you may be curious about the "TYPO TABLE" that appears at the end of most of our BASIC listings. TYPO is a program that helps you find the typing errors you make when entering programs from ANTIC. It produces a table of values that can be used to pinpoint the program segment where a line was entered incorrectly. The TYPO article and program listing appeared in the February 1984 issue of ANTIC ("TYPO," page 42) in our new listing format, and with improved instructions. It originally appeared in our August 1982 issue.

STARSECTOR DEFENSE continued from page 73

```
:SOUND Z,Z,Z,Z:FOR X=1 TO 20:NEXT X
1090 IF STRIG(Z)=Z THEN 1370
1100 POSITION 4,21:? #6;"hit  trigger"
:SOUND Z,180,10,10:FOR X=1 TO 40:NEXT
X:GOTO 1080
1110 REM LET'S INITIALIZE
1120 POKE 106,PEEK(106)-5:GRAPHICS 17:
GOSUB 1520:BASE=PEEK(106)+3:BSR=BASE*2
56
1130 SHLDDMG=1790:INIT=255:POKE SHLDDM
G,0:GOSUB 1540:GOSUB 1580:X=USR(1779)
1140 POSITION 3,1:? #6;"STARSECTOR":PO
SITION 9,3:? #6;"DEFENSE"
1150 POSITION 5,7:? #6;"by":POSITION 6
,10:? #6;"john wilson":POSITION 2,23:?
 #6;"ONE MOMENT PLEASE"
1160 REM GO REDEFINE CHARACTER SET
1170 GOSUB 1600:POKE 756,BASE:POSITION
 2,23:? #6;"                 ":SOUND Z
,Z,Z,Z:GOSUB 1510:POKE C+264,251
1180 POKE C+256,251:POKE C+418,251:POK
E C+425,251:SHPLOC=C+305
1190 POKE SHPLOC+11,189:POKE SHPLOC,3:
FOR X=10 TO 1 STEP -1:POKE SHPLOC+X,22
0:SOUND Z,250-X*10,8,10
1200 FOR Y=1 TO 10:NEXT Y:POKE SHPLOC+
X,0:NEXT X:SOUND Z,Z,Z,Z:POKE SHPLOC,Z
:E=SHPLOC:GOSUB 900
1210 FOR Y=1 TO 5
1220 POSITION 3,18:? #6;"BATTLE STATIO
NS":SOUND 1,180,10,5:SOUND Z,183,10,5:
FOR X=1 TO 80:NEXT X
1230 POSITION 3,18:? #6;"
  ":SOUND 1,250,10,5:SOUND Z,253,10,5:
FOR X=1 TO 26:NEXT X:NEXT Y
1240 SOUND Z,Z,Z,Z:SOUND 1,Z,Z,Z
1250 FOR X=1 TO 100:NEXT X
1260 REM READ IN SHIP'S GRAPHIC CHARAC
TER FOR ALL EIGHT DIRECTIONS
1270 RESTORE 1280:FOR X=1 TO 8:READ D:
SHIP(X)=D:NEXT X:Y=50:FOR X=1 TO 10
1280 DATA 2,3,6,4,8,5,7,1
1290 REM READ LASER GRAPHICS
1300 RESTORE 1310:FOR X=1 TO 8:READ D:
LS(X)=D+192:NEXT X
1310 DATA 29,28,31,30,29,28,31,30
1320 REM READ IN MOVEMENT FACTORS FOR
EIGHT DIRECTIONS
1330 RESTORE 1340:FOR X=Z TO 8:READ D:
MOVF(X)=D:NEXT X
1340 DATA 0,-19,1,21,20,19,-1,-21,-20
1350 F1=F2=F3=F4=1:HORB=27+64:VERTB=26
+64:Z=0
1360 REM SET UP SCREEN AND FIND UPPER
LEFT CORNER
1370 GRAPHICS 17:GOSUB 1520:POKE 756,B
ASE:GOSUB 1510:CE=C+9*20+9
1380 REM DRAW BORDER AND INITIALIZE VA
RIABLES ETC.
1390 FOR X=C TO C+19:POKE X,HORB:NEXT
X:FOR X=C+400 TO C+419:POKE X,HORB:NEX
T X
1400 FOR X=C TO C+400 STEP 20:POKE X,V
ERTB:POKE X+19,VERTB:NEXT X:ALIEN=61+1
28:STAR=59+192:BH=60:ASTER=62+64
1410 SHPLOC=CE+4:ROTATE=2:POKE SHPLOC,
SHIP(ROTATE):FOR Y=1 TO 5
1420 X=CE+((INT(RND(Z)*2)+2)*2)*MOVF(I
NT((RND(Z)*8)+1)):IF PEEK(X)<>Z THEN 1
420
1430 POKE X,STAR:NEXT Y:PAUSE=1010:POK
E 764,255
1440 THRDIR=Z:SHLD=100:SCORE=Z:POKE CE
,BH:POSITION 13,22:? #6;"SHIELDS":POSI
TION Z,22:? #6;"SCORE":GOSUB 820
1450 MAN=63+192:MANC=Z:FOR Y=1 TO 8
1460 X=CE+((INT(RND(Z)*2)+2)*2)*MOVF(I
NT((RND(Z)*8)+1)):IF PEEK(X)<>Z THEN 1
460
1470 POKE X,ASTER:NEXT Y
1480 NA=3:INCFLG=0:FOR X=1 TO NA:AL(X)
=CE:NEXT X
1490 REM GO TO START OF LOOP
1500 GOTO 180
1510 C=PEEK(88)+256*PEEK(89):RETURN
1520 SETCOLOR 3,Z,14:SETCOLOR 1,2,8:SE
TCOLOR Z,7,6:SETCOLOR 2,3,6:RETURN
1530 REM VERT BLANK ROUT ON PAGE SIX
1540 RESTORE 1550:FOR X=1536 TO 1603:R
EAD D:POKE X,D:NEXT X:RETURN
1550 DATA 206,114,6,208,60,169,3,141,1
14,6,173,254,6,240,50,201,255,208,22,1
69,15,141,254,6,141
1560 DATA 0,210,141,255,6,169,111,141,
1,210,141,115,6,76,65,6,206,254,6,173,
255,6,24,105,16
1570 DATA 141,255,6,141,0,210,206,115,
6,173,115,6,141,1,210,76,95,228
1580 RESTORE 1590:FOR X=1779 TO 1789:R
EAD D:POKE X,D:NEXT X:RETURN
1590 DATA 104,162,6,160,0,169,6,32,92,
228,96
1600 RESTORE 1610:FOR X=Z TO 511:READ
D:SOUND Z,130-X/4,8,8:POKE BSR+X,D:NEX
T X:RETURN
1610 DATA 0,0,0,0,0,0,0,0,60,36,24,24,
36,219,255,153,6,7,43,116,216,172,24,4
8
1620 DATA 224,96,83,237,237,83,96,224,
153,255,219,36,24,24,36,60,7,6,202,183
```

continued on next page

```
,183,202,6,7
1630 DATA 48,24,172,216,116,43,7,6,96,
224,212,46,27,53,24,12,12,24,53,27,46,
212,224,96
1640 DATA 0,16,0,66,103,33,8,0,0,136,1
2,4,112,48,4,128,0,0,12,14,32,48,48,0
1650 DATA 0,24,48,0,0,16,24,48,0,0,132
,230,66,0,0,0,0,0,112,96,12,12,8,0
1660 DATA 12,24,8,0,64,12,24,0
1670 DATA 127,99,99,99,99,99,127,0,56,
24,24,24,62,62,62,0,127,3,3,127,96,96,
127,0
1680 DATA 126,6,6,127,7,7,127,0,112,11
2,112,112,119,127,7,0,127,96,96,127,3,
3,127,0
1690 DATA 124,108,96,127,99,99,127,0,1
27,3,3,31,24,24,24,0,62,54,54,127,119,
119,127,0
1700 DATA 127,99,99,127,7,7,7,0
1710 DATA 129,129,129,255,255,129,129,
129,255,0,0,0,0,0,0,255,0,0,0,255,0,0,
0,0
1720 DATA 1,2,4,8,16,32,64,128,8,8,8,8
,8,8,8,8,128,64,32,16,8,4,2,1
```



```
1730 DATA 0,0,24,36,36,24,0,0
1740 DATA 63,51,51,127,115,115,115,0,1
26,102,102,127,103,103,127,0,127,103,1
03,96,99,99,127,0
1750 DATA 126,102,102,119,119,119,127,
0,127,96,96,127,112,112,127,0,127,96,9
6,127,112,112,112,0
1760 DATA 127,99,96,111,103,103,127,0,
115,115,115,127,115,115,115,0,127,28,2
8,28,28,28,127,0
1770 DATA 12,12,12,14,14,110,126,0,102
,102,108,127,103,103,103,0,48,48,48,11
2,112,112,126,0
1780 DATA 103,127,127,119,103,103,103,
0,103,119,127,111,103,103,103,0,127,99
,99,103,103,103,127,0
1790 DATA 127,99,99,127,112,112,112,0,
127,99,99,103,103,103,127,7,126,102,10
2,127,119,119,119,0
1800 DATA 127,96,127,3,115,115,127,0,1
27,28,28,28,28,28,28,0,103,103,103,103
,103,103,127,0
1810 DATA 103,103,103,103,111,62,28,0,
103,103,103,111,127,127,103,0,115,115,
115,62,103,103,103,0
1820 DATA 103,103,103,127,28,28,28,0,1
27,102,108,24,55,103,127,0
1830 DATA 16,84,56,254,56,84,16,0,126,
195,129,129,129,129,195,126,0,56,40,40
,124,40,56,0
1840 DATA 56,62,110,255,187,254,118,60
,0,0,16,56,16,40,0,0
```

TYPO TABLE

Variable checksum = 3776102

Line num range			Code	Length
5	–	60	LS	551
70	–	170	UW	510
180	–	270	WZ	500
280	–	380	DG	519
390	–	500	JL	482
510	–	620	UP	317
630	–	720	MI	584
730	–	830	FU	562
840	–	920	EX	600
930	–	1030	KD	615
1040	–	1130	QI	567
1140	–	1190	BI	551
1200	–	1270	XY	577
1280	–	1380	TD	502
1390	–	1450	VD	540
1460	–	1550	HL	508
1560	–	1630	RR	565
1640	–	1710	CJ	504
1720	–	1780	FH	536
1790	–	1840	QG	467

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listing conventions

Table Information

Our custom font listings represent each ATASCII character as it appears on the video screen. You generate some characters by a single keystroke, for example, the regular alphabet. Others require a combination or sequence of keystrokes. In this table, ESC means *press and release* the escape key before pressing another key. CTRL or SHIFT means *press and hold* the control or shift key while simultaneously pressing the following key.

The Atari logo key (⅄) "toggles" inverse video for all alphanumeric and punctuation characters. Press the logo key once to turn it on; press again to turn it off. In the XL line there is no logo key; inverse video is controlled by the Reverse Video Mode key. Decimal values are given as reference, and correspond to the CHR$ values often used in BASIC listings.

NORMAL VIDEO

FOR THIS	TYPE THIS	DECIMAL VALUE
	CTRL ,	0
	CTRL A	1
	CTRL B	2
	CTRL C	3
	CTRL D	4
	CTRL E	5
	CTRL F	6
	CTRL G	7
	CTRL H	8
	CTRL I	9
	CTRL J	10
	CTRL K	11
	CTRL L	12
	CTRL M	13
	CTRL N	14
	CTRL O	15
	CTRL P	16
	CTRL Q	17
	CTRL R	18
	CTRL S	19
	CTRL T	20
	CTRL U	21
	CTRL V	22
	CTRL W	23
	CTRL X	24
	CTRL Y	25
	CTRL Z	26
	ESC ESC	27
	ESC CTRL −	28
	ESC CTRL =	29
	ESC CTRL +	30
	ESC CTRL *	31
	CTRL .	96
	CTRL ;	123
|	SHIFT =	124
	ESC SHIFT CLEAR	125
	ESC DELETE	126
	ESC TAB	127

INVERSE VIDEO

FOR THIS	TYPE THIS	DECIMAL VALUE
	⅄CTRL ,	128
	⅄CTRL A	129
	⅄CTRL B	130
	⅄CTRL C	131
	⅄CTRL D	132
	⅄CTRL E	133
	⅄CTRL F	134
	⅄CTRL G	135
	⅄CTRL H	136
	⅄CTRL I	137
	⅄CTRL J	138
	⅄CTRL K	139
	⅄CTRL L	140
	⅄CTRL M	141
	⅄CTRL N	142
	⅄CTRL O	143
	⅄CTRL P	144
	⅄CTRL Q	145
	⅄CTRL R	146
	⅄CTRL S	147
	⅄CTRL T	148
	⅄CTRL U	149
	⅄CTRL V	150
	⅄CTRL W	151
	⅄CTRL X	152
	⅄CTRL Y	153
	⅄CTRL Z	154
	ESC SHIFT DELETE	156
	ESC SHIFT INSERT	157
	ESC CTRL TAB	158
	ESC SHIFT TAB	159
	⅄CTRL .	224
	⅄CTRL ;	251
	⅄SHIFT =	252
	ESC CTRL 2	253
	ESC CTRL DELETE	254
	ESC CTRL INSERT	255

Make Art with your Atari!

Create a microscreen with your Atari computer and see it published in ANTIC! Many techniques exist, including the use of commercial products such as **Micro-Painter, Graphic Master, PAINT, Fun With Art** and **Drawit.*** Or you may want to use **Keystroke Artist**, a graphics utility program that appeared in the August 1983 issue of ANTIC. Send your creations to Microscreens, care of ANTIC, on disk, and accompany them with loading instructions and a short biographical note about yourself. Good luck!

*Micro-Painter and Graphic Master are products of DataSoft, 9421 Winnetka Ave., Chatsworth, CA 91311. PAINT is a product of Atari, Inc. Fun With Art is a product of Epyx, 1043 Kiel Court, Sunnyvale, CA 94089. Drawit is a product of APX (Atari Program Exchange), P.O. Box 3705, Santa Clara, CA 95055.

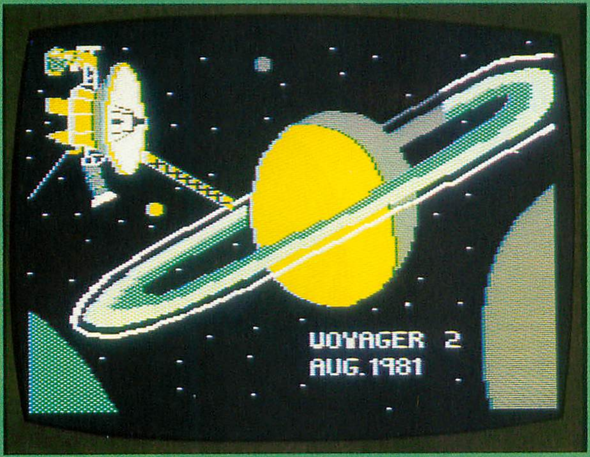
microscreens



Dean Derhak's complete entry to Microscreens included 11 striking scenes entitled "Dean's History of Space Exploration." He originally created them for a computer art contest sponsored by a television station in Salt Lake City. He won First Prize: an Atari 800.

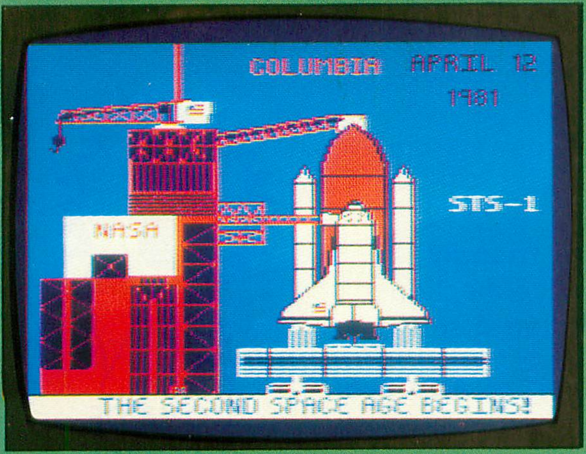
Dean, 15, attends prep school and is a member of the Aerospace Institute, a group that lobbies in favor of space travel and study. Inspired by the work of astronomer Carl Sagan, he hopes to become an astronaut.

He used **Graphic Master** to lay down the basic geometric shapes for these microscreens, then transferred the pictures to **Micro-Painter** to fill in most of the details. We've picked three of our favorite screens from "Dean's History" for this month's column.



On July 20, 1969, Neil Armstrong became the first man to set foot on the moon. This microscreen depicts an Apollo landing site. A lunar rover is also pictured.

In 1981, the Voyagers, launched in 1977, gave Earth its most spectacular photos yet of the ringed planet Saturn. In 1986, Voyager II will encounter Uranus.



On April 12, 1981, the space shuttle Columbia, sister to the Enterprise, made a successful launch and flight. Later that year it completed a second flight, thus beginning the Second Space Age . . .

CASSETTE LOOKALIKE– YOUR DISK DRIVE

Test cassette software on your disk drive

by ERIC VERHEIDEN

SYNOPSIS

This program will allow you to make your disk drive work like a cassette. It requires BASIC and at least 16K RAM, and runs on all Atari computers.

If you're a BASIC programmer, you're probably aware that the disk operating system (DOS) occupies more than 5600 bytes of RAM that would otherwise be available for your program. If you use cassettes for storage, you can access these bytes, but cassette storage is slow and unreliable. SEQDOS lets you use this extra memory without having to sacrifice the speed of a disk drive. You also might want to simulate the cassette environment to develop programs for cassette use.

Type in the BASIC program, Listing 1, and test it with TYPO. Listing 2 is the machine-language segment of SEQDOS in assembly-language format. This is presented for your information; you don't need to type in this listing to use SEQDOS. Now RUN the program. After a delay, the message "SEQDOS INIT COMPLETE" will appear.

You now have several choices. To create a SEQDOS disk, insert a blank disk into drive 1 and press [RETURN]. This will format the disk and write SEQDOS to its first two sectors as a boot file. This is a "SEQDOS disk." Otherwise, press [BREAK], and you'll be able to read and write to existing SEQDOS disks (see below). You also can exit to DOS and write SEQDOS to a DOS disk as a binary AUTORUN.SYS file. When this disk is booted, you can transfer files between DOS and SEQDOS.

To create the AUTORUN.SYS file, type DOS [RETURN] from BASIC. When the DOS menu appears, type [K] [RETURN], and then:

AUTORUN.SYS,600,6FF,609

The instructions above describe two methods for creating SEQDOS. If you use the AUTORUN.SYS technique and boot that disk, SEQDOS will load automatically after DOS and you can transfer files between the two. If you boot from a SEQDOS disk, you won't be able to use DOS. Once SEQDOS is in effect, you should use normal cassette commands (e.g., CSAVE, CLOAD, etc.) to store to and load from a SEQDOS disk.

There is, however, one important restriction: Never use SEQDOS to write files to a DOS disk, or you'll lose files on that disk. The reverse is also true: **Never** write DOS files to a SEQDOS-formatted disk. If you try, you'll probably get an error message, but, again, you may lose some of your files.

COMMAND YOUR DISK

To write files to a SEQDOS disk, insert it into drive 1 and write to it in the desired format using device "C:", as with the cassette recorder. For instance, in addition to the commands mentioned above you can use LIST"C:", SAVE"C:", or OPEN#3,8,0,"C:" followed by a series of PUTs and a final CLOSE #3. Files are written sequentially, as with a cassette, and must be read back in the same order using the proper format for each file. The first write operation following a series of reads "rewinds" the disk, and starts at the beginning again.

Files can be read with the usual cassette commands, such as CLOAD and ENTER"C:". You must read the file in the same format in which you wrote it. That is, if you use CSAVE, you must use CLOAD to read the file; if you use LIST "C:", you must use ENTER"C:". The first read operation that follows one or more write operations also "rewinds" the disk and begins with the first file.

To properly set up input for a subsequent file, each file should be read to its end. To keep the program short (it just fits into Page Six), its error checking is minimal. Any sort of error, including end-of-file, generates ERROR 136. A full SEQDOS disk holds slightly less than 90,000 bytes.

If you load SEQDOS from a SEQDOS disk, it will reinitialize itself if you press [RESET]. If it is loaded as an AUTORUN.SYS file, however, the normal cassette

continued on next page

handlers will be restored if you press [RESET]. To restore SEQDOS, execute the following from BASIC:

POKE 2,9:POKE 3,6:POKE 9,3

TECHNICAL INFORMATION

SEQDOS fits into a single page of memory, Page Six. Moreover, nonessential information is written at the end of each sector (see locations $67D–$67F and $6FD–$6FF in the assembled source code). As a result, the program writes itself to disk with a little tampering, places flags in the indicated bytes, and runs properly. The format routine is left out when SEQDOS writes itself to disk as the boot file.

The file format produced by SEQDOS is similar to that of DOS. The last three bytes of each sector contain sector-link information and a sector-byte count. The sector link for the last sector of each file is zero. Each file occupies a contiguous block of sectors, and immediately follows the preceding file. SEQDOS makes no provision for a directory.

Eric Verheiden is the author of Vervan's utility programs (CASDUP, CASDIS, FULMAP, DISASM, DISDUP, and DOWNLD) and of the forthcoming Secrets of Atari I/O *(IJG). He holds a Ph.D. from the California Institute of Technology and works for an aerospace firm in Southern California.*

Listing 1

```
5 REM SEQDOS
6 REM BY ERIC VERHEIDEN
7 REM ANTIC MAGAZINE
10 DIM INP$(1)
20 DATA 0,2,0,6,9,6,24,96
30 DATA 104,169,67,162,0,142,44,6
40 DATA 221,26,3,240,5,232,232,232
50 DATA 208,246,169,224,157,27,3,169
60 DATA 6,157,28,3,96,165,42,162
70 DATA 3,160,0,201,0,208,8,162
80 DATA 0,160,0,232,208,1,200,142
90 DATA 126,4,140,125,4,141,44,6
100 DATA 9,247,133,61,169,125,141,103
110 DATA 6,160,1,96,36,62,16,38
120 DATA 165,61,9,128,170,208,12,160
130 DATA 64,208,4,160,128,133,47,132
140 DATA 62,166,61,232,134,61,224,125
150 DATA 176,22,165,47,36,62,48,3
160 DATA 189,0,4,157,0,4,160,1
170 DATA 96,49,1,33,0,0,4,0
180 DATA 173,125,4,41,3,141,11,3
190 DATA 168,173,126,4,141,10,3,170
200 DATA 13,11,3,240,54,142,48,6
210 DATA 140,50,6,162,5,189,218,6
220 DATA 157,0,3,202,16,247,36,62
230 DATA 16,28,169,87,141,2,3,165
240 DATA 61,16,8,162,255,142,125,4
250 DATA 142,126,4,141,127,4,238,126
260 DATA 4,208,3,238,125,4,32,83
270 DATA 228,16,3,160,136,96,173,127
280 DATA 4,41,127,141,103,6,162,255
290 DATA 208,137,49,1,82,0,0,4
300 DATA 36,6,75,6,86,6,90,6
310 DATA 117,6,117,6,76,118,6,104
320 DATA 162,5,189,121,6,157,0,3
330 DATA 202,16,247,76,83,228
340 MLSTART=1536
350 MLEND=1789
360 FOR X=MLSTART TO MLEND
370 READ Y:POKE X,Y:NEXT X
380 X=USR(1544)
390 PRINT "SEQDOS INIT COMPLETE"
400 PRINT "INSERT BLANK DISK INTO DRIV
E #1"
410 PRINT "THEN PRESS RETURN TO FORMAT
";:INPUT INP$
415 ? "↖↖↓↓↓▶WARNING!! This will forma
t the ":? "▶disk in Drive one and eras
e any"
416 ? "▶data that may have been on it.
 ":? :? "▶CONTINUE(Y/N)";:INPUT INP$:I
F INP$<>"Y" THEN END
420 X=USR(1775)
430 OPEN #3,8,0,"C:"
440 POKE 1150,1
450 FOR I=1536 TO 1660:PUT #3,PEEK(I)
460 NEXT I
470 FOR I=1664 TO 1774:PUT #3,PEEK(I)
480 NEXT I
490 CLOSE #3
500 POKE 1580,0
510 PRINT "SEQDOS FORMAT COMPLETE"
520 STOP
```

TYPO TABLE

Variable checksum = 138691

Line num range	Code	Length
5 – 90	NE	311
100 – 210	UX	363
220 – 330	KC	355
340 – 430	GT	396
440 – 520	TF	184

Listing 2

```
1000          *=       $0600           ; program origin
1010 ;
1020 ; SYMBOL EQUATES
1030 ;
1040 EOL      =        $9B             ; end-of-line symbol
1050 ;
1060 ; ADDRESS EQUATES
1070 ;
1080 WARMST   =        $08             ; warm start flag
1090 BOOTQ    =        $09             ; boot flag
1100 ICAX1Z   =        $2A             ; direction byte
1110 ICAX6Z   =        $2F             ; put byte storage
1120 BPTR     =        $3D             ; buffer pointer
1130 FTYPE    =        $3E             ; input/output flag
1140 DCB      =        $0300           ; data control block
1150 DCOMND   =        $0302           ; command byte
1160 DAUX1    =        $030A           ; sector LSB
1170 DAUX2    =        $030B           ; sector MSB
1180 HATABS   =        $031A           ; handler table
1190 CASBUF   =        $0400           ; cassette buffer
1200 DSKINV   =        $E453           ; disk interface routine
1210 ;
1220 ; HEADER BYTES
1230 ;
1240 PST      .BYTE    0               ; boot header
1250          .BYTE    2               ; sector count
1260          .WORD    PST             ; program start
1270          .WORD    PINIT           ; program init
1280          CLC                      ; good boot
1290          RTS                      ; return
1300 ;
1310 ; BASIC ENTRY
1320 ;
1330          PLA                      ; pull arg count
1340 ;
1350 ; CASSETTE HANDLER SWAP
1360 ;
1370 PINIT    LDA      #$43            ; look for "C:
1380          LDX      #0              ; first handler
1390          STX      CHKSTA+1        ; clear I/O state
1400 FINHND   CMP      HATABS,X        ; check handler
1410          BEQ      FNDHND          ; if found
1420 ;
1430          INX                      ; otherwise, next handler

1440          INX
1450          INX
1460          BNE      FINHND
1470 ;
1480 FNDHND   LDA      #NEWTAB&$FF     ; set new table
1490          STA      HATABS+1,X
1500          LDA      #NEWTAB/256     ; also set MSB
1510          STA      HATABS+2,X
1520          RTS                      ; return
1530 ;
1540 ; OPEN FILE HANDLER
1550 ;
1560 OPNFIL   LDA      ICAX1Z          ; check direction
1570          LDX      #$03            ; if new direction,
1580          LDY      #0              ;   start at sector #3
1590 CHKSTA   CMP      #0              ; check against old
1600          BNE      RESET           ;  direction
1610 ;
1620 SAUX1    LDX      #0              ; old sector number
1630 SAUX2    LDY      #0
```

continued on next page

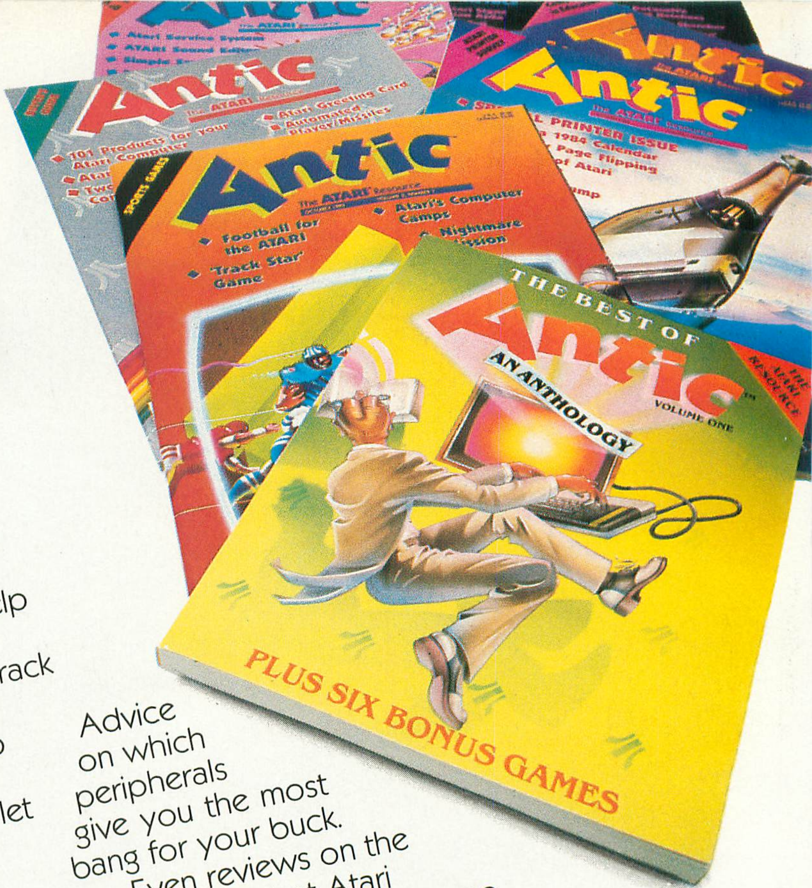
assembly language

```
1640            INX                     ; increment sector
1650            BNE     RESET
1660 ;
1670            INY
1680 ;
1690 RESET      STX     CASBUF+$7E      ; store sector number
1700            STY     CASBUF+$7D
1710            STA     CHKSTA+1        ; save direction state
1720            ORA     #$F7            ; =$FF for write
1730            STA     BPTR            ; save for new pointer
1740            LDA     #$7D            ; starting length
1750            STA     BYTCNT+1        ; save length
1760            LDY     #1              ; good status
1770            RTS                     ; return
1780 ;
1790 ; CLOSE FILE HANDLER
1800 ;
1810 CLSFIL     BIT     FTYPE           ; check I/O type
1820            BPL     DUMMY           ; do nothing if read
1830 ;
1840            LDA     BPTR            ; prepare for final
1850            ORA     #$80            ;  sector output
1860            TAX
1870            BNE     INCBYT          ; output last sector
1880 ;
1890 ; GET/PUT BYTE HANDLER
1900 ;
1910 GETBYT     LDY     #$40            ; input direction
1920            BNE     SAVDIR
1930 ;
1940 PUTBYT     LDY     #$80            ; output direction
1950            STA     ICAX6Z          ; save output byte
1960 SAVDIR     STY     FTYPE           ; save direction
1970            LDX     BPTR            ; get pointer
1980 INCBYT     INX                     ; increment
1990            STX     BPTR            ; save pointer
2000 BYTCNT     CPX     #$7D            ; check for sector end
2010            BCS     ENDSEC          ; perform I/O
2020 ;
2030            LDA     ICAX6Z          ; get output byte
2040            BIT     FTYPE           ; if output, store
2050            BMI     STORE
2060 ;
2070            LDA     CASBUF,X        ; otherwise, read
2080 STORE      STA     CASBUF,X        ;  and store
2090 DUMMY      LDY     #1              ; good status
2100            RTS                     ; return
2110 ;
2120 ; FORMAT DCB
2130 ;
2140 FMTBLK     .BYTE   $31,$01         ; format block for init
2150            .BYTE   $21,$00
2160            .WORD   CASBUF
2170 ;
2180            *=      $680            ; allow for flag bytes
2190 ;                                  ;  from init routine
2200 ENDSEC     LDA     CASBUF+$7D      ; get sector
2210            AND     #$03
2220            STA     DAUX2           ; save to DCB sector
2230            TAY                     ; save for later
2240            LDA     CASBUF+$7E      ; also do MSB
2250            STA     DAUX1
2260            TAX                     ; save for later
2270            ORA     DAUX2           ; check for last
2280            BEQ     ERROR           ; if so, end-of-file
2290 ;
```

continued on page 92


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product reviews

MICKEY IN THE GREAT OUTDOORS

Walt Disney Productions
500 S. Buena Vista St.
Burbank, CA 91521
(213) 840-1000
(800) 423-2555
(except CA and Hawaii)
(213) 840-1726
(call collect from CA and Hawaii)
$44.95, 32K — diskette

Reviewed by Rhonda Holmes

Mickey in the Great Outdoors consists of four engaging learning games that incorporate the fun of Mickey Mouse into an outstanding educational program. Seven young "consultants," aged six through eleven, helped me come to this conclusion. The program is officially targeted at children from seven to ten years old.

"Mickey Goes Hiking" includes two games that teach language skills. The object of the first game is to help Mickey successfully complete a journey. To do this he must, first of all, climb a series of stepping stones by completing several five-word sentences. The correct missing word for each sentence is hidden in one of the clouds floating along the top of the screen. By making Mickey shoot an arrow into the right cloud, you enable him to finish his trek, which leads him across a stream. All the children enjoyed this game and played it well.

The second game, in which four letters are rearranged to spell a word, was not as easy. The six and seven year olds had an especially tough time with it.



However, it is a game that encourages a player to continue, and a player's skills can grow with practice.

The goal of the first game in "Mickey Goes Exploring" is to complete a mathematical equation. You must help Mickey catch the butterfly that carries the correct number or mathematical operation. The six, seven, and eight year olds I tested did better with addition and subtraction than with multiplication. With practice, however, they can learn their multiplication and division; the computer provides the correct answer after two mistakes have been made. It also gives you an easier problem to try following an error. By the way, the game's graphics are enchanting.

The final game covers more complex logic problems. You are asked to complete a pattern of numbers (e.g., 12, 24, 36, 48, etc.) Delightful graphics again appear as you try to help Mickey choose the correct answers. This activity stumped the older children; they needed adult help to solve the higher numbered patterns.

Each of these games has several levels of difficulty; either the characters' movements speed up or the length of the time limits decrease. The first three games, especially, offer a choice of hundreds or even thousands of words or operations that provide new challenges each time you play.

"Mickey in the Great Outdoors" can offer hours of play and, at the same time, help a child to develop a number of essential learning skills.

Offers hours of play and helps a child to develop a number of essential learning skills.

MPP-1000C MODEM

Microbits Peripheral Products
225 W. Third St.
Albany, OR 97321
(503) 967-9075
$149.95

Reviewed by John Weber

The Microbits **1000C** is a modem that can be used without an 850 interface. The 1000C comes complete with a cable designed to plug into joystick port 2 of your Atari. It weighs less than eight ounces. Although it was built to operate at 300 baud, you can set rates as low as 100 or as high as 450 to accommodate computers that use a nonstandard rate.

The 1000C modem comes with a terminal program, Smart Terminal, in ROM cartridge form. Some of the program's features include upload/download capabilities, a choice between full or half-duplex, and auto-dial/auto-answer.

Its auto-dial/auto-answer feature sets the 1000C apart from other low-priced modems. You can store up to nine phone numbers on cassette or disk and let the computer dial them for you. You can also set the program to auto-answer, a capability you'll especially appreciate if you want to set up an electronic mailbox or bulletin board.

In addition, the 1000C lets you download directly to a disk or printer, thus bypassing your Atari's RAM buffer. This is an effective way to retrieve large files. You can also store data in as many as nine RAM buffers; this feature allows you to store multiple files in memory simultaneously. Data can be transferred from these RAM buffers to cassette, disk or printer.

Smart Terminal incorporates Ward Christensen's XMODEM protocol. As a result, it lets you send or receive files in any format — including tokenized BASIC and binary — without appending extraneous control codes. These control codes necessary with less sophisticated software often cause obscure load problems.

MPP's 1000C modem comes with a clearly written 20-page manual, as well

as a one-year warranty and a free one-hour subscription to The Source. If you've been waiting for a direct-connect modem at a good price with software included, then this may be the modem for you.

RM1000 RADIO MODEM

Macrotronics, Inc.
1125 N. Golden State Blvd., Suite G
Turlock, CA 95380
(209) 667-2888
$239.00

Reviewed by Dick Slavens

Amateur, or "ham," radio operators who own Atari personal computers can now see RTTY (radioteletype) and Morse Code messages translated right on their monitor screens. The reason: the **RM1000 Radio Modem**, a hardware/software package designed for both novice and advanced users.

The hardware consists of a box with cables that interface with your Atari via joystick ports 1 and 2, and with a shortwave radio (carrying the audio signal from your radio to the modem). The front panel of the box holds the power switch, a LED tuning indicator, and four status indicators. The back panel has connectors for I/O and power, and has been silkscreened so that its pins can be easily identified.

You must order the **RM400** accessory package to obtain the correct software and interface cable for the Atari 400/800 computer. The price of this software/cable package is $59 for the disk or cassette version, or $99 for the ROM cartridge version.

Since the Atari XL-model computers require that you load the Translator disk before using this software, XL owners should purchase the disk version of the RM400 accessory package. The cartridge version can be used on a 16K RAM machine, and, except for a limited "auto-answer" capability, includes the same features as the cassette and disk versions.

When you load the RM400 software, you first see a three-window display. The top window, a six-line multipurpose area, includes a type-ahead buffer display, a preprogrammed message display, and a break-mode buffer. The next three lines constitute a status display; they display the time, status, transmit and receive words-per-minute (wpm), and the amount of unused buffer space. The remaining 15 lines are used to view the transmission.

If you hear a Morse Code station on your ham radio, select the Morse Code mode and tune in the station; the decoded text will appear in the "on-line" window. The RM400 software uses an auto-speed and character/Morse-Code-receive algorithm with a variable noise threshold. It also uses high-quality filters. As a result, even poor receivers yield good results. And using RTTY is just as easy; in fact, in RTTY mode the RM1000 modem was able to translate signals that I was not able to hear.

The RM1000 Radio Modem comes with excellent documentation, which includes a 77-page manual and a quick reference card. One chapter in the manual is devoted to "Detailed Interfacing" for ham transmitter operation. For hardware buffs, the manual's "Theory of Operation" section features both block diagrams and a large fold-out schematic.

VOLKSMODEM

Anchor Automation
6913 Valjean Ave.
Van Nuys, CA 91406
(213) 997-6493
$79.95

Reviewed by Matthew Ratcliff

The **Volksmodem** is a basic 300-baud, direct-connect modem. It features a talk/data switch, which also acts as a power switch, as well as a switch for full/half duplex. It automatically selects whether it's in answer or originate mode. This modem does not offer auto-dial or auto-answer capabilities, therefore it cannot be used as a Bulletin Board Service.

The Volksmodem connects directly to the phone jack, and the phone connects to the modem. As a result, you can use it with any kind of telephone, including the new, one-piece models without detachable handsets.

The Volksmodem gets power from the telephone line. If the line voltage should drop unexpectedly, it uses a nine-volt battery for backup power, a nice design touch.

The basic Volksmodem does not include a cable, so Atari owners must purchase either a 'C' or an 'F' cable available from Anchor. If you have an 850 Interface or its equivalent, you can use the less expensive 'C' cable ($12.95). If you don't have an 850, you must use the 'F' cable ($39.95). The 'F' cable connects the Volksmodem directly to joystick port 2 of your Atari computer. The Volksmodem with the 'F' cable can be used with all Atari computers. Cassette based terminal software comes with the 'F' cable.

My Volksmodem worked perfectly the first time I used it, and I've found it to be quite reliable. It comes with a lifetime warranty, which makes it more attractive than many, more expensive modems that offer only 90-day warranties. With Volksmodem, Anchor has produced an affordable modem that should provide years of dependable service.

INTER-LISP/65

Datasoft
19808 Nordhoff Place
Chatsworth, CA 91311
(213) 701-5161
$99.95, 48K — disk

Reviewed by James Dearner

In the 1950's, computer scientists at M.I.T. created LISP (short for LISt Processing) to use in their artificial intelligence (AI) research. In LISP, the programmer works with symbolic expressions that are composed of atoms (word-like strings) and lists (groups of

continued on next page

product reviews

atoms). LISP's functions allow you to manipulate these symbolic expressions, and even to define new functions for the language.

Datasoft's version of LISP, **INTER-LISP/65,** is a subset of LISP (described by Winston and Horn in *LISP*, 1981). The INTER-LISP/65 package contains this book, an excellent introduction to the language, an 86-page manual, and a disk that includes LISP as well as several demonstration and utility programs.

The language itself consists of over 40 LISP functions, including CAR, CDR, ATOM, LAMBDA and LENGTH. Also included are functions that let you access Atari's sound and graphics capabilities, and give you direct access to memory. There are also functions for I/O (input/output), including random access with disk drives.

An impressive LISP editor is also included. LISP uses many parentheses within parentheses, and these can quickly befuddle almost any programmer. The editor, once you understand its workings, makes changing LISP expressions much simpler. This is one of the finest editors I've seen for any language.

If you're experienced with LISP, you can use the manual to find any differences between this version and the one you're familiar with. However, there is no tutorial material. If you're just learning the language, you'll find yourself frequently referring to both the manual and Winston and Horn.

Overall, this is an excellent implementation of LISP, but it isn't fully compatible with implementations for other systems. The MACLISP simulator that comes with INTER-LISP/65 simulates some of the missing functions. However, as these are only simulations (and one doesn't work), it still won't be fully compatible.

If you're new to computers, you will need patience and perseverance to master this language. If you're familiar with BASIC or FORTRAN, you'll need to break some old habits and learn to love (( )). I, for one, am sold on LISP and on this implementation. Even though it's not perfect — it's quite slow — INTER-LISP/65 is a good introduction to artificial intelligence and to programming that interacts naturally with people. It provides a programming environment rich in power and elegance.

LODE RUNNER

Broderbund Software, Inc.
17 Paul Dr.
San Rafael, CA 94903
(415) 479-1170
$34.95, 48K — diskette

Reviewed by Bryan Welch

A number of computer games use the "jump and climb" theme: you know, you've got to maneuver your man through a screen filled with girders, ropes, ladders, and just about anything else the game's designer could dream up. **Lode Runner** follows this trend, but also includes many original elements that make it worth looking at more closely.

The object of the game is to collect all the treasures on each level of a mine and escape without being caught by the guards. You do this by weaving your man in and out of the girders, bars, and ladders that fill the screen. The relentless guards would easily catch you if you didn't have your one means of defense: a laser drill pistol. With it you can dig holes and passageways in the brick girders. If a guard falls into a hole, he's trapped — leaving you a split second in which to escape!

The gameplay of Lode Runner is fairly simple, but if you want to see the upper levels you'll have to use your wits. Each screen is totally unique, and requires a different strategy. However, if you play the levels in order (there is a way to cheat and start on the upper levels, but your name won't be put on the high score list if you do), you'll find you can develop better strategies to overcome each set of obstacles. This is one of the reasons that just about anyone can play Lode Runner. It may also explain why it's so addicting.

As if the 150 levels included with the game weren't enough to keep you occupied, Lode Runner also includes a "game generator" that allows you to create your own screens. Once you know how to use this feature, only your imagination limits what you can accomplish! And this is where Lode Runner's great documentation really helps. It is clear and complete, and does an excellent job of teaching you how to take advantage of the many features of both the game and the game generator.

Lode Runner successfully combines strategy and arcade action. Your score depends on technique rather than solely on the speed of your trigger finger. This makes it fun for everyone, not just for expert game players. So if you like strategic action games with lots of extra features (and who doesn't), you'll love Lode Runner.

KEN USTON'S PROFESSIONAL BLACKJACK

Screenplay
Box 3558
Chapel Hill, NC 27514
(919) 493-8596
$69.95, 48K — disk

Reviewed by Harvey Bernstein

Barred from every casino in Las Vegas, Ken Uston is known and feared in casinos throughout the world. Prior to becoming a writer in the microcomputer field, he was renowned as a professional blackjack player and card counter. He now brings his considerable expertise to the realm of the Atari computer with his new game, **Ken Uston's Professional Blackjack**.

This menu-driven program offers you a number of options. For example, you can play according to the house rules of any casino in the world, or you can set up your own rules; you can also practice on either of two drill modules

— one on card counting and another on betting strategy.

In addition to the basic documentation, Ken Uston's Professional Blackjack includes a lengthy booklet that explains blackjack's rules and strategy, and why it's easier to win at blackjack than at other card games. It also offers four progressively complex betting and card-counting systems, from Basic Strategy (if you just want to break even) to Advanced (for the aspiring blackjack professional).

The important question is: Does it work? In a recent try-out in Las Vegas, I used Uston's second most advanced betting/counting strategy. After four hours of play, I left Las Vegas $170 richer.

Of course, the program can't guarantee that you'll win — gambling is, after all, a gamble. It does, however, give you a slight edge over the house, provided that you're a pretty good player to begin with.

At $70, Ken Uston's Professional Blackjack is too expensive for someone who's simply looking for a computerized card game. But if blackjack is your game and Vegas your town, I recommend this package.

TRAINS

Spinnaker Software Corp.
215 First St.
Cambridge, MA 02142
(617) 868-4700
$39.95, 48K — disk

Reviewed by George J. Adamson

Trains is a computerized simulation that transports kids of all ages back to the golden age of the Iron Horse in the Old West. It allows the fantasy railroad tycoon to expand his or her empire without taking over the living room.

This game may appeal more to adults who grew up in the era of the Lionel electric train than to youngsters who are more familiar with **Ms. Pac Man**. After all, shunting a train back and forth electronically — with a joystick as throttle — to align a particular car with a particular section of track can be as frustrating as operating the most idiosyncratic electric train. Railroad buffs should find it well worth the trouble, though.

Unlike a model railroad set, Trains teaches you about the economics of railroad operations as well as the mechanics. As the owner/engineer of a Civil War-era steam locomotive, you're faced with tough decisions worthy of such legendary railroad moguls as Jay Gould and Commodore Vanderbilt.

To keep the railroad operating and expanding, you must make a profit. Industries must be served and goods shipped, from oil well to refinery, from logging camp to sawmill, from farm to market, from mine to factory. The locomotive's tender must be kept full of coal and train crews must be paid regularly. And, just to keep things interesting, unpredictable work stoppages and strikes are thrown in to add a touch of realism.

The game opens with an attractive animation sequence that shows a hi-res train meandering across a western desert and through a tunnel. Eight settings are included: two each in the desert, the mountains, the plains, and the city. Famous western towns such as Durango, Leadville, Silverton and Colorado Springs are represented, and you're given an aerial view of the track at each level. If you switch the train to a spur line, the disk drive is activated and a new scene appears.

If you're interested in the legacy of the Old West and its railroads, and want to learn more about them, you'll enjoy Trains. It's one of my personal favorites, and occupies a valued niche in my library of games.

ULTIMA 1

Sierra On-Line
Sierra On-Line Building
Coarsegold, CA 93614
(209) 683-6858
$34.95, 48K — disk

Reviewed by Bryan Welch

You are a dwarf wizard who must rid the world of evil by destroying the wicked Mondain. Before you can do this, however, you must travel far and wide to gain wisdom and experience. During your journeys over land and water, as well as through space and time, you'll visit cities, castles and dungeons; meet monsters, clobber skeletons and wipe out bats, and earn both gold and experience.

But, beware! Thieves, necromancers and jesters will complicate your mission. Be prepared to spend days, weeks, or even months on your quest. The only way to destroy Mondain is to steal a valuable gem that's in his possession; getting it from him is the game's real challenge.

But you don't have to be a dwarf wizard to enjoy **Ultima I**. You can choose to be a human adventurer, an elf fighter, or a hobbit thief instead. The program lets you create your own "hero."

The game begins in medieval times. You're armed at first with primitive daggers, swords and magic spells, but as the game progresses and you gain experience, updated modes of travel and warfare, including laser weapons, are made available to you.

You move on a scrolling map that contains symbolic figures. These figures leave a lot — maybe too much — to your imagination. This may be a disappointment to those of you who are accustomed to arcade-style graphics. Also, all of Ultima's cities and castles have identical layouts; some differentiation here would have made the game more interesting. But its playability more than makes up for these graphic weaknesses.

Ultima takes a long time to play, so its save feature comes in handy. However, multiple disk exchanges are required to save and load the game, which makes these procedures somewhat cumbersome. In spite of these minor drawbacks, I became addicted to this game because of the many variables and new discoveries it contains. I heartily recommend that adventure gamers include Ultima I in their permanent library.

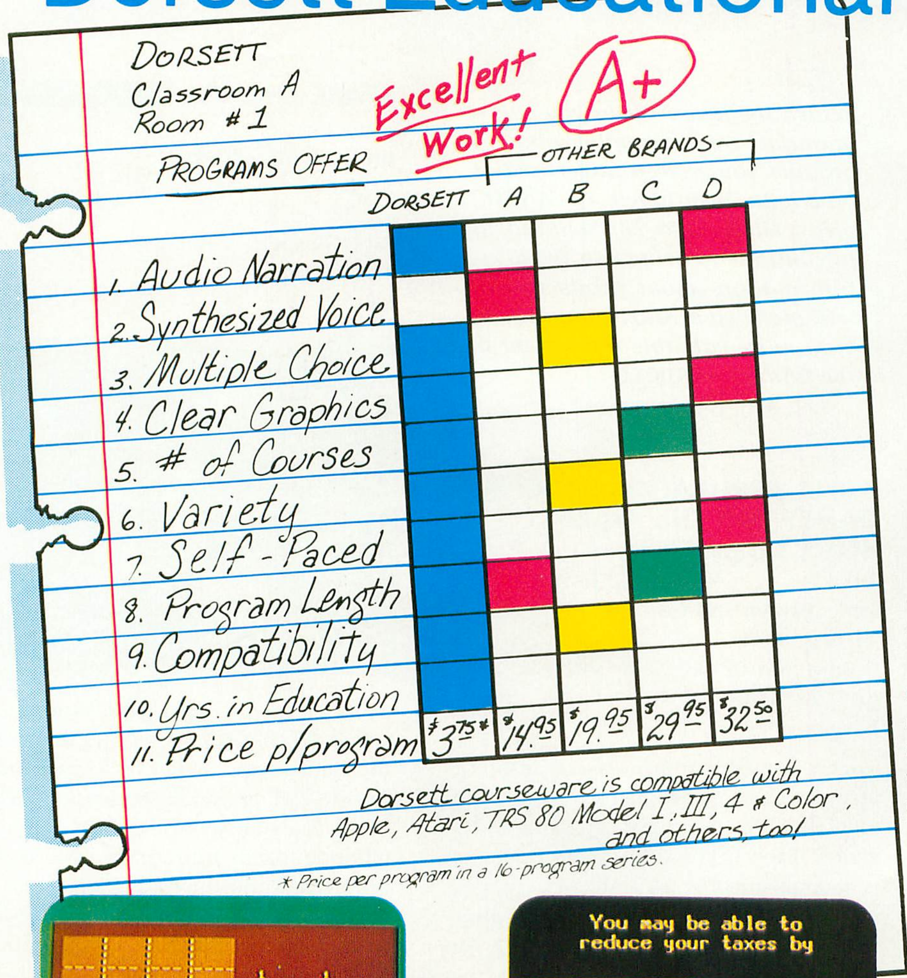
CASSETTE LOOK ALIKE continued from page 84

```
2300         STX   SAUX1+1      ; save sector for open
2310         STY   SAUX2+1
2320         LDX   #$05         ; set up DCB
2330 SETDCB  LDA   RDSEC,X
2340         STA   DCB,X
2350         DEX
2360         BPL   SETDCB
2370 ;
2380         BIT   FTYPE        ; check for write
2390         BPL   GODISK       ; if not, go ahead
2400 ;
2410         LDA   #$57         ; change command to write
2420         STA   DCOMND
2430         LDA   BPTR         ; check for last sector
2440         BPL   STBPTR
2450 ;
2460         LDX   #$FF         ; clear sector
2470         STX   CASBUF+$7D
2480         STX   CASBUF+$7E
2490 STBPTR  STA   CASBUF+$7F   ; save byte count
2500         INC   CASBUF+$7E   ; increment sector link
2510         BNE   GODISK
2520 ;
2530         INC   CASBUF+$7D
2540 GODISK  JSR   DSKINV       ; perform I/O
2550         BPL   SETSEC
2560 ;
2570 ERROR   LDY   #$88         ; error or end-of-file
2580         RTS
2590 ;
2600 SETSEC  LDA   CASBUF+$7F   ; get byte count
2610         AND   #$7F
2620         STA   BYTCNT+1     ; save
2630         LDX   #$FF         ; set for first byte
2640         BNE   INCBYT       ; return
2650 ;
2660 ; READ SECTOR DCB
2670 ;
2680 RDSEC   .BYTE $31,$01      ; DCB for read sector
2690         .BYTE $52,$00
2700         .WORD CASBUF
2710 ;
2720 ; HANDLER TABLE
2730 ;
2740 NEWTAB  .WORD OPNFIL-1     ; open handler
2750         .WORD CLSFIL-1     ; close handler
2760         .WORD GETBYT-1     ; get byte handler
2770         .WORD PUTBYT-1     ; put byte handler
2780         .WORD DUMMY-1      ; rest dummy
2790         .WORD DUMMY-1
2800         JMP   DUMMY
2810 ;
2820 ; FORMAT DISK
2830 ;
2840         PLA                ; for BASIC call
2850         LDX   #$05         ; move format block
2860 MVFMT   LDA   FMTBLK,X     ;  to DCB
2870         STA   DCB,X
2880         DEX
2890         BPL   MVFMT
2900 ;
2910         JMP   DSKINV       ; format and return
2920 ;
2930         .END
```

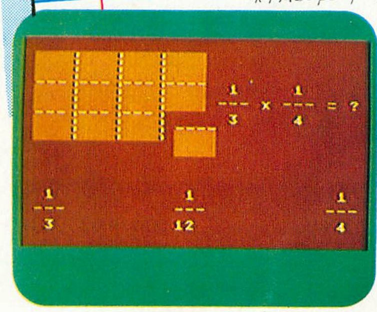
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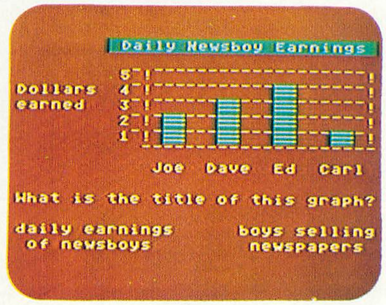
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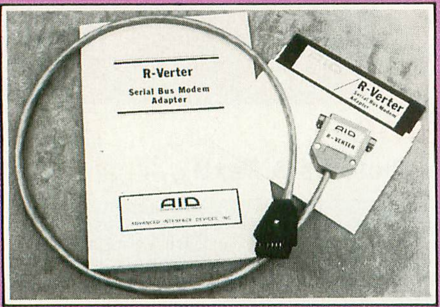
FLIPSKETCH

(graphics utility)
Dynacomp, Inc.
1427 Monroe Ave.
Rochester, NY 14618
(800) 828-6772
In NY — (716) 442-8960
16K — cassette — $19.95
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Flipsketch combines a powerful drawing program with impressive animation features to let you animate your drawings. Its low-resolution graphics allow you to create as many screens as possible (up to 56 screens with 40K). These screens include one background frame. You use a joystick to design each frame, choosing from up to 24 different colors. You can animate your work in one of two ways: sequential animation (each screen is displayed in the order in which it was created) or programmed animation (screens are displayed in any order you desire). Drawings can be saved on disk or cassette.

R-VERTER

(modem adapter)
Advanced Interface Devices, Inc.
P.O. Box 2188
Melbourne, FL 32902
(305) 676-1275
$49.95



The **R-Verter** allows you to use most modems and other RS-232C devices with your computer without using an interface module. The accompanying software package includes a smart-terminal emulator and an RS-232C device handler. It requires no other peripherals, doesn't use a joystick port, and comes with a built-in 3-foot cable. It's said to be compatible with any RS-232C device that accepts TTL-level inputs (most do).

Return the favor. When you call a manufacturer or supplier about a product you've seen advertised or otherwise mentioned in ANTIC, please tell them so. This will help us to continue to bring you the latest information about products that will make your Atari computer an even more valuable investment in the future. —ANTIC ED

HOME APPLICATIONS AND GAMES FOR THE ATARI HOME COMPUTERS

(book)
Little, Brown and Co.
34 Beacon St.
Boston, MA 02106
(617) 227-0730
$14.50

There's something for everyone in this assortment of 24 programs for the Atari, including 13 application programs and 11 games. Each of the fully-coded programs is accompanied by a complete description of its function, a line-by-line explanation of how it works, and a string and numeric variable table. As a result, a reader can either key in a given program and run it as is, or modify it for his or her own use.

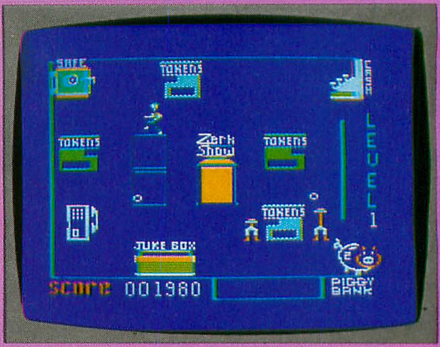
MENUWRITER

(application program)
Dynatech Microsoftware, Inc.
7847 N. Caldwell Ave.
Niles, IL 60648
(800) 621-4109
In IL — (312) 470-0700
48K — diskette — $29.95

With the touch of a single key, non-programmers can load and run computer programs from "menus" that are generated automatically by **MenuWriter**, one of Dynatech's CodeWriter programs. Up to 20 different screen/menus can be created, each showing up to 15 directory entries. After the user tells MenuWriter what he or she wants to do and how the files are to be indexed, the program automatically translates these English instructions into computer "code" and runs the requested program.

SPARE CHANGE

(game)
Broderbund Software
17 Paul Dr.
San Rafael, CA 94903
(415) 479-1170
48K—diskette
$34.95



Slapstick humor, sight gags, surprises and action fill this zany comedy game. You're the game-happy owner of a Spare Change Arcade that's invaded by two fun-loving Zerks. It's your job to stop them from pilfering tokens from the arcade. The only way to do this is to keep them occupied — use every trick in the book, from popping popcorn to playing their favorite tunes on the jukebox. A "Zerk Control Panel" lets you instantly modify the Zerks' behavior, if you can stop laughing long enough.

MP-1150 PRINTER INTERFACE

(printer interface)
Microbits Peripheral Products
225 W. Third St.
Albany, OR 97321
(503) 967-9075
$99.95

This new interface from MPP, which replaces the Atari 850 Interface Module, doesn't require that you change a ROM chip, as did their previous model. The computer-end plugs directly into the Atari's serial I/O port. The other end of the three-foot cable is a Centronics plug, compatible with most non-Atari parallel printers. The interface also features an Atari-style serial jack, so you can daisy-chain other peripherals. It's compatible with all software and all models of Atari computers.

new products

SUPER-TEXT

(word processor)
Muse
347 N. Charles St.
Baltimore, MD 21201
(301) 659-7212
48K—diskette
$99.00

This word processor is designed for use with the Atari 400/800/1200XL computers. According to the manufacturer, it is suitable for business, home or educational applications. It offers standard editing functions, including a find-and-replace function and a preview mode; print formatting includes page numbering, automatic page breaks, superscripts and subscripts. It also has the ability to create a printer driver, and contains Atari DOS.

AGENT USA

(educational game)
Scholastic, Inc.
730 Broadway
New York, NY 10003
(212) 505-3567
48K—diskette
$29.95



This action adventure game features a spy who saves the U.S.A. from an alien force. It teaches American geography, knowledge of distance, direction and time, decision making, and problem solving while involving youngsters in a non-aggressive story. The game's action moves cross country and takes place on trains and in train stations with local city skylines as backdrops. Colorful visuals and lively music make it an entertaining learning experience. Support materials for students and teachers are also included.

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(light pen)
Madison Computer
1825 Monroe St.
Madison, WI 53711
(608) 255-5552
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McPen is a high-resolution light pen that permits precise vertical *and* horizontal positioning on the monitor screen. It allows you to answer questions, create drawings, choose options and play games while retaining full functional use of your keyboard. In addition, a sensitivity control on the stand lets you finetune McPen to suit your individual needs.

SPACE COWBOY

(game)
Microcomputer Games, Inc.,
A Div. of The Avalon Hill Game Co.
4517 Hartford Rd.
Baltimore, MD 21214
(301) 254-9200
48K—diskette
$21.00



This fast-paced arcade game challenges its cowboy hero to run a gauntlet lined with robot lasers and other thrilling pitfalls. The only path to freedom is a narrow walkway. Will he make it? Only you and the Cowboy know for sure.

BAR MITZVAH COMPU-TUTOR

(educational program)
Davka Corp.
845 N. Michigan Ave., Suite 843
Chicago, IL 60611
(800) 621-8227
In IL — (312) 944-4070
48K — diskette — $49.95

Bar Mitzvah Compu-Tutor is an instructional aid that helps prepare Jewish young people for bar or bat mitzvah. Each copy of the program is customized to include the English and Hebrew names of the student who will use it. The program allows the student to progress at his or her own pace. English translations of all texts used in the program, as well as an original commentary on the Haftarah, are also provided.

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(utility)
Gemini Software
32 Dennis Lane
Buffalo, NY 14227
(716) 893-5115
32K—diskette
$39.95

Now you can add ears to your Atari. This program digitizes the human voice, or any other sound, and lets you play back and edit the results and incorporate them into your programs. It can graphically analyze sounds for the best possible reproduction, while dazzling you with colors. The program disk comes with an audio cord that plugs into the Atari joystick port.

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(application)
Lateral Software
P.O. Box 605
Stanton, CA 90680
(714) 826-3970
48K—diskette or cassette
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Using a method of logical analysis, **Decisions** helps you make reasoned choices among several alternatives. It can assist individuals, families, and businesses in making difficult decisions quickly, accurately, and confidently through the use of features such as fully prompted inputs and help screens. A helpful reference manual is included.

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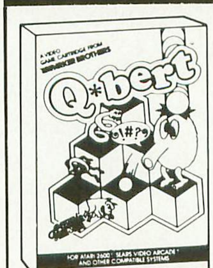
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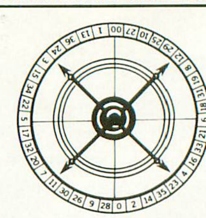
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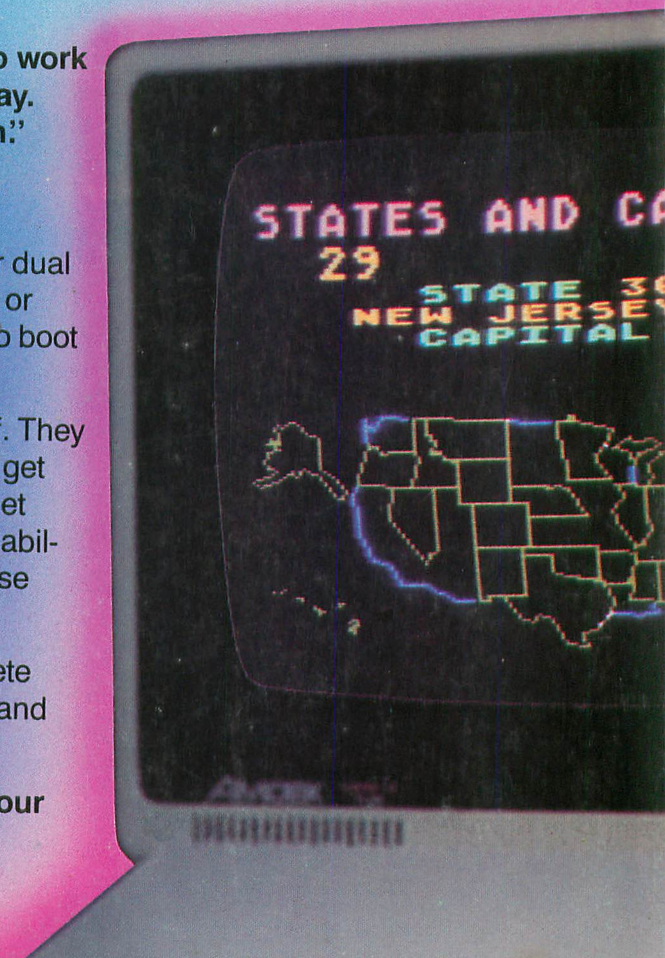
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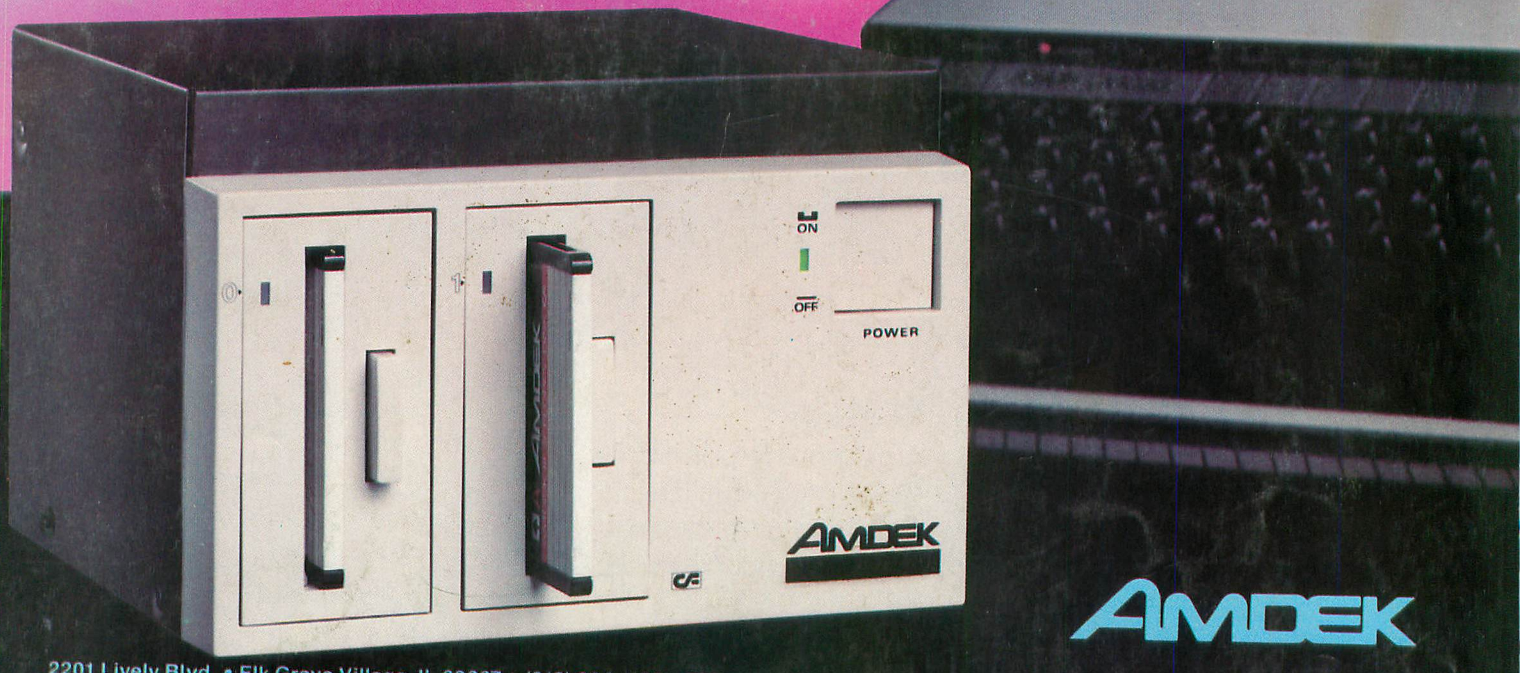
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